

## 2004 Chevrolet Blazer

2004 BRAKES Hydraulic Brakes - Blazer/S10, Jimmy/Sonoma

### 2004 BRAKES

Hydraulic Brakes - Blazer/S10, Jimmy/Sonoma

## SPECIFICATIONS

### FASTENER TIGHTENING SPECIFICATIONS

#### Fastener Tightening Specifications

| Application                         | Specification |          |
|-------------------------------------|---------------|----------|
|                                     | Metric        | English  |
| ABS Sensor Wire Bracket Bolt        | 17 N.m        | 13 lb ft |
| Bleeder Valve                       | 7 N.m         | 62 lb in |
| Brake Junction Block Bolt           | 17 N.m        | 13 lb ft |
| Brake Pedal Pivot Bolt              | 25 N.m        | 19 lb ft |
| Brake Pipe Fittings                 | 17 N.m        | 13 lb ft |
| Brake Pipe Fittings to BPMV         | 20 N.m        | 15 lb ft |
| Brake Pipe Fittings Master Cylinder | 30 N.m        | 22 lb ft |
| Front Flex Hose to Caliper Bolt     | 44 N.m        | 32 lb ft |
| Front Flex Hose Support Clip Nut    | 22 N.m        | 16 lb ft |
| Master Cylinder Mounting Nut        | 36 N.m        | 27 lb ft |
| Rear Flex Hose to Bracket Bolt      | 17 N.m        | 13 lb ft |
| Vacuum Booster Mounting Nut         | 40 N.m        | 30 lb ft |

### BRAKE COMPONENT SPECIFICATIONS

#### Brake Component Specifications

| Application                             | Specification |           |
|-----------------------------------------|---------------|-----------|
|                                         | Metric        | English   |
| Brake Pressure Modulator Bleeder Valves | 9 N.m         | 80 lb in  |
| Brake Caliper Bleeder Valve Front       | 13 N.m        | 115 lb in |
| Brake Caliper Bleeder Valve Rear        | 11 N.m        | 97 lb in  |

### BRAKE SYSTEM SPECIFICATIONS

#### Brake System Specifications

| Application                   | RPO     | Specification  |                |
|-------------------------------|---------|----------------|----------------|
|                               |         | Metric         | English        |
| Brake Assist Tandem Diaphragm | JC1/JM3 | 260 mm         | 10.24 in       |
| Brake Master Cylinder         | JC1/JM3 | 25.4 mm        | 1 in           |
| Front Disc Brakes             | JC1     | 274.32 x 28.96 | 10.8 x 1.14 in |

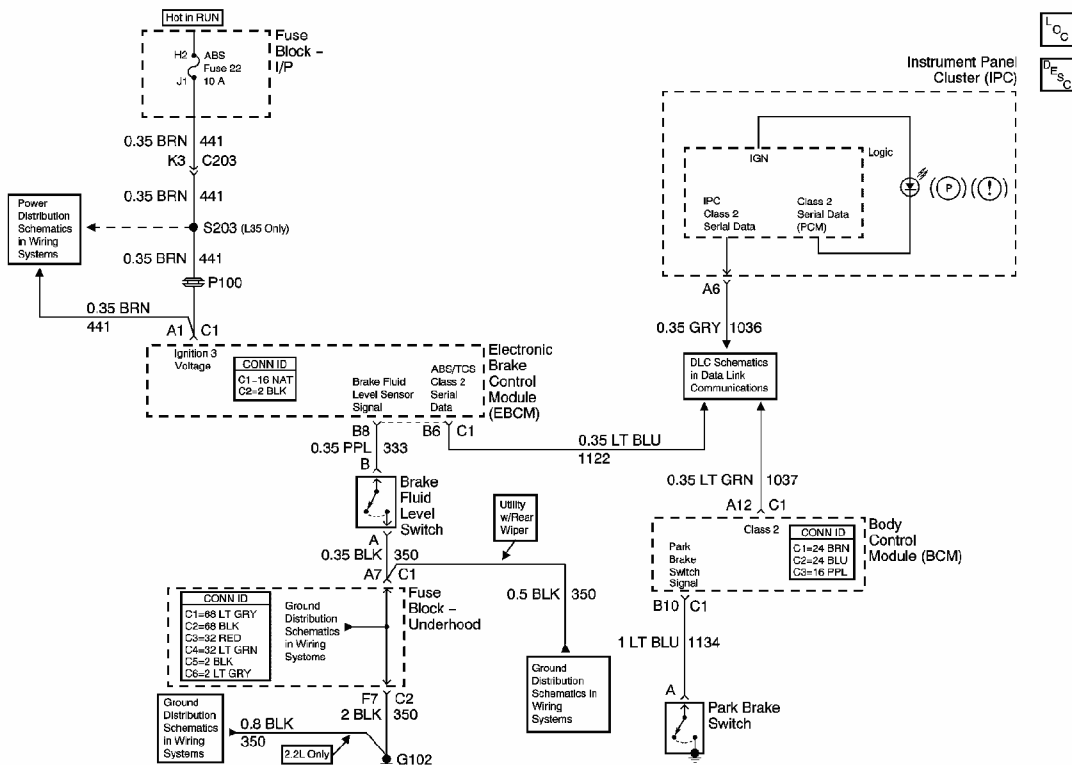
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|                   |     |                      |                |
|-------------------|-----|----------------------|----------------|
|                   |     | mm                   |                |
| Front Disc Brakes | JM3 | 266.7 x 26.16<br>mm  | 10.5 x 1.03 in |
| Rear Disc Brakes  | JC1 | 294.64 x 20.07<br>mm | 11.6 x .79 in  |
| Rear Drum Brakes  | JM3 | 240.30 x 50.80<br>mm | 9.5 x 2 in     |

## SCHEMATIC AND ROUTING DIAGRAMS

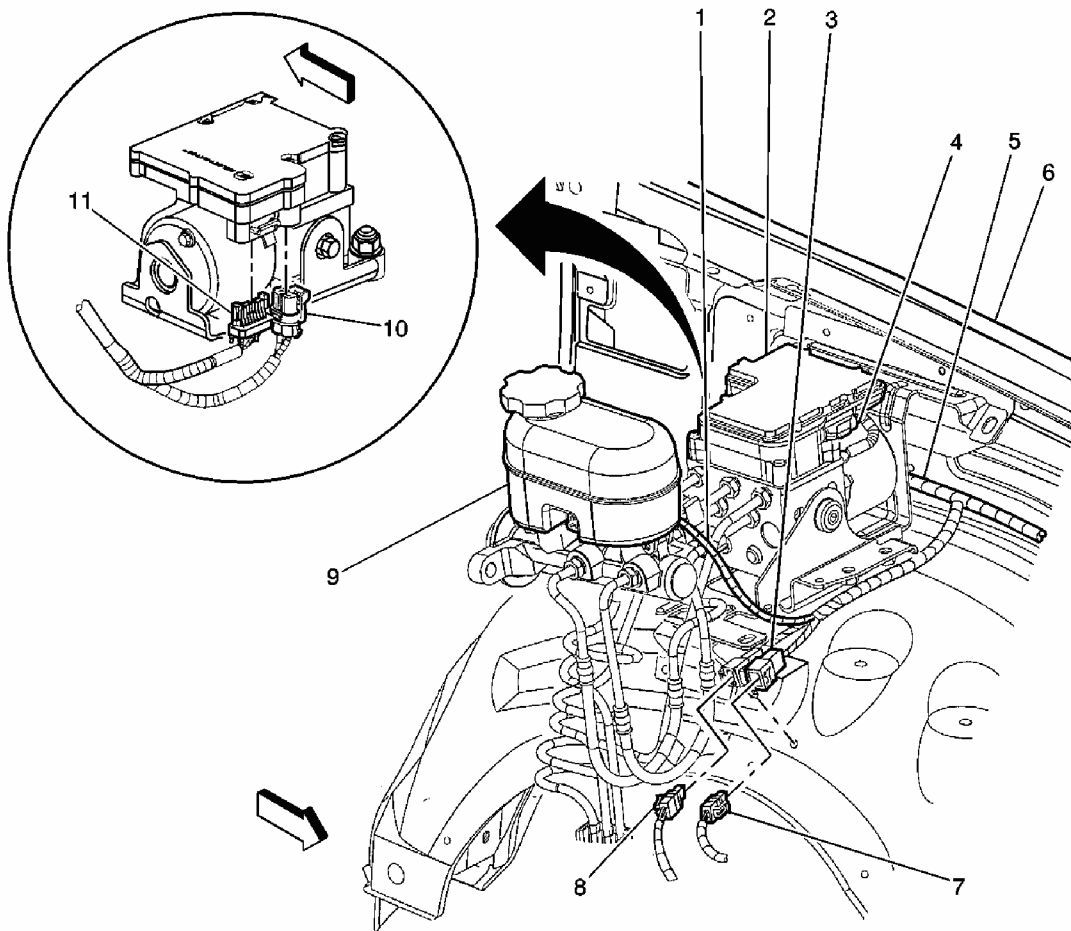
## BRAKE WARNING SYSTEM SCHEMATICS



**Fig. 1: Brake Warning System**  
**Courtesy of GENERAL MOTORS CORP.**

## COMPONENT LOCATOR

## HYDRAULIC BRAKES COMPONENT VIEWS



**Fig. 2: Electronic Brake Control Module (EBCM)**  
**Courtesy of GENERAL MOTORS CORP.**

### Callouts For Fig. 2

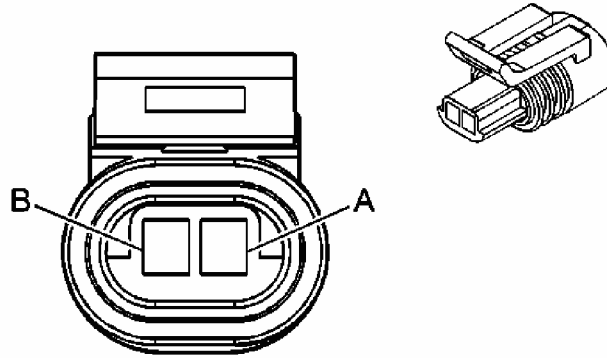
| Callout | Component Name                                      |
|---------|-----------------------------------------------------|
| 1       | Brake Fluid Level Switch Connector                  |
| 2       | Electronic Brake Control Module (EBCM)              |
| 3       | C114                                                |
| 4       | Pump Motor                                          |
| 5       | Body Harness                                        |
| 6       | LF Fender                                           |
| 7       | C114                                                |
| 8       | C109                                                |
| 9       | Brake Master Cylinder                               |
| 10      | Electronic Brake Control Module (EBCM) Connector C2 |
| 11      | Electronic Brake Control Module (EBCM) Connector C1 |

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### HYDRAULIC BRAKES CONNECTOR END VIEWS

#### Brake Fluid Level Switch

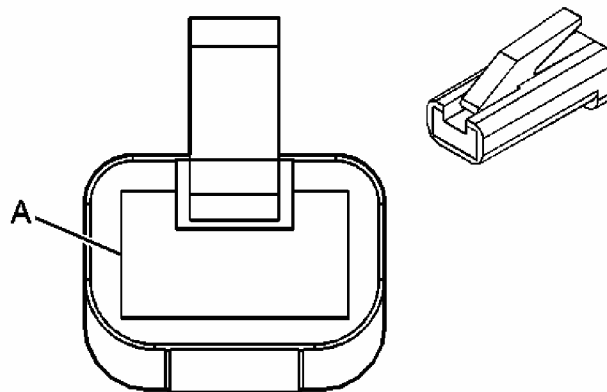


#### Connector Part Information

- 12162195
- 2-Way F Metri-Pack 150.2 Series, Sealed (BLK)

| Pin | Wire Color | Circuit No. | Function                        |
|-----|------------|-------------|---------------------------------|
| A   | BLK        | 350         | Ground                          |
| B   | PPL        | 333         | Brake Fluid Level Sensor Signal |

#### Park Brake Switch



#### Connector Part Information

- 12004267
- 1-Way F 56 Series (BLK)

| Pin | Wire Color | Circuit No. | Function                 |
|-----|------------|-------------|--------------------------|
| A   | LT BLU     | 1134        | Park Brake Switch Signal |



## DIAGNOSTIC INFORMATION AND PROCEDURES

### DIAGNOSTIC STARTING POINT - HYDRAULIC BRAKES

Begin the system diagnosis by reviewing the system Description and Operation. Reviewing the Description and Operation information will help you determine the correct symptom diagnostic procedure when a malfunction exists. Reviewing the Description and Operation information will also help you determine if the condition described by the customer is normal operation. Refer to **Symptoms - Hydraulic Brakes** in order to identify the correct procedure for diagnosing the system and where the procedure is located.

### SYMPTOMS - HYDRAULIC BRAKES

**IMPORTANT:** The following steps must be completed before using the symptom tables.

1. Perform the **Brake System Vehicle Road Test** before using the hydraulic brake symptom tables in order to duplicate the customer's concern.
2. Review the system operation in order to familiarize yourself with the system functions. Refer to the following:
  - **Brake Warning System Description and Operation**
  - **Hydraulic Brake System Description and Operation**
  - **Brake Assist System Description and Operation**
  - **Hydraulic Brake Component Operation Visual Inspection**

#### Visual/Physical Inspection

- Inspect for aftermarket devices which could affect the operation of the Hydraulic Brake System. Refer to **Checking Aftermarket Accessories** in Wiring Systems.
- Inspect the easily accessible or visible system components for obvious damage or conditions which could cause the symptom.

#### Intermittent

Faulty electrical connections or wiring may be the cause of intermittent conditions. Refer to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems.

#### Symptom List

Refer to a symptom diagnostic procedure from the following list in order to diagnose the symptom:

- **Brake Warning Indicator Always On**
- **Brake Warning Indicator Inoperative**
- **Brake Pulsation**
- **Brake System Noise**
- **Braking Action Uneven - Pulls to One Side**
- **Braking Action Uneven - Front to Rear**
- **Brake Pedal Excessive Travel**
- **Brake Pedal Excessive Effort**
- **Brakes Drag**
- **Brake System Slow Release**
- **Brake Fluid Loss**

**BRAKE WARNING INDICATOR ALWAYS ON**

**Brake Warning Indicator Always On**

| Step                                                                                                                                                                                                                                                                               | Action                                                                                                                                                                                                                                       | Yes                                                                                     | No                                       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|------------------------------------------|
| <b>Schematic Reference: Brake Warning System Schematics</b><br><b>Connector End View Reference: Hydraulic Brakes Connector End Views ABS</b><br><b>Connector End Views in Anti-lock Brake System and, Body Control System</b><br><b>Connector End Views in Body Control System</b> |                                                                                                                                                                                                                                              |                                                                                         |                                          |
| 1                                                                                                                                                                                                                                                                                  | Did you review the Brake Warning System Description and Operation and perform the necessary inspections?                                                                                                                                     | Go to <b>Step 2</b>                                                                     | Go to <b>Symptoms - Hydraulic Brakes</b> |
| 2                                                                                                                                                                                                                                                                                  | 1. Turn OFF the ignition for 5 seconds.<br>2. Ensure the park brake is released.<br>3. Turn ON the ignition while observing the brake warning indicator.<br><br>Does the brake warning indicator illuminate for 3 seconds and then turn OFF? | Go to <b>Testing for Intermittent Conditions and Poor Connections in Wiring Systems</b> | Go to <b>Step 3</b>                      |
| 3                                                                                                                                                                                                                                                                                  | 1. Install a scan tool.<br>2. Select the Instrument Panel Cluster Special Functions menu on the scan tool.<br>3. Command the Brake Lamp OFF.<br><br>Does the brake warning indicator turn OFF?                                               | Go to <b>Step 4</b>                                                                     | Go to <b>Step 11</b>                     |
|                                                                                                                                                                                                                                                                                    | 1. Select Input 1 from the Body Control Module Data Display menu on the scan                                                                                                                                                                 |                                                                                         |                                          |

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|    |                                                                                                                                                                                                                                                                                                                                                                                                                                           |                      |                      |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------------|
| 4  | <p>tool.</p> <p>2. Ensure the park brake is released.</p> <p>3. Observe the Park Brake status on the scan tool.</p> <p>Does the scan tool display Released?</p>                                                                                                                                                                                                                                                                           | Go to <b>Step 5</b>  | Go to <b>Step 6</b>  |
| 5  | <p>Disconnect the brake fluid level switch or brake pressure differential switch (if equipped), harness connector.</p> <p>Does the brake warning indicator turn OFF?</p>                                                                                                                                                                                                                                                                  | Go to <b>Step 12</b> | Go to <b>Step 8</b>  |
| 6  | <p>Disconnect the park brake switch harness connector.</p> <p>Does the brake warning indicator turn OFF?</p>                                                                                                                                                                                                                                                                                                                              | Go to <b>Step 9</b>  | Go to <b>Step 7</b>  |
| 7  | <p>1. Disconnect from the BCM, the harness connector containing the park brake switch output circuit.</p> <p>2. Test the park brake switch output circuit for a short to ground. Refer to <b>Circuit Testing</b> and <b>Wiring Repairs</b> in Wiring Systems.</p> <p>Did you find and correct the condition?</p>                                                                                                                          | Go to <b>Step 14</b> | Go to <b>Step 10</b> |
| 8  | <p>1. Disconnect from the EBCM, the harness connector containing the brake fluid level sensor or brake pressure differential switch (if equipped), signal circuit.</p> <p>2. Test the brake fluid level sensor or brake pressure differential switch (if equipped), signal circuit for a short to ground. Refer to <b>Circuit Testing</b> and <b>Wiring Repairs</b> in Wiring Systems.</p> <p>Did you find and correct the condition?</p> | Go to <b>Step 14</b> | Go to <b>Step 13</b> |
| 9  | <p>Replace the park brake switch. Refer to <b>Park Brake Warning Lamp Switch Replacement</b> in Park Brake.</p> <p>Did you complete the replacement?</p>                                                                                                                                                                                                                                                                                  | Go to <b>Step 14</b> | -                    |
| 10 | <p><b>IMPORTANT:</b></p> <p><b>Perform the set up procedure for the BCM.</b></p> <p>Replace the BCM. Refer to <b>Body Control</b></p>                                                                                                                                                                                                                                                                                                     |                      |                      |

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|    |                                                                                                                                                                                                                                                                            |                      |                     |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|---------------------|
|    | <b>Module Replacement</b> in Body Control System.Did you complete the replacement?                                                                                                                                                                                         | Go to <b>Step 14</b> | -                   |
| 11 | Replace the instrument panel cluster. Refer to <b>Instrument Panel Cluster (IPC) Replacement</b> in Instrument Panel, Gages and Console.<br>Did you complete the replacement?                                                                                              | Go to <b>Step 14</b> | -                   |
| 12 | Replace the brake fluid level switch or brake pressure differential switch (if equipped). Refer to <b>Master Cylinder Reservoir Replacement</b> or 50181.<br>Did you complete the replacement?                                                                             | Go to <b>Step 14</b> | -                   |
| 13 | <b>IMPORTANT:</b><br><b>Following EBCM replacement, use the scan tool to perform the Tire Size Calibration procedure.</b><br><br>Replace the EBCM. Refer to <b>Electronic Brake Control Module Replacement</b> in Anti-lock Brake System.Did you complete the replacement? | Go to <b>Step 14</b> | -                   |
| 14 | 1. Turn OFF the ignition for 5 seconds.<br>2. Ensure the park brake is released.<br>3. Turn ON the ignition while observing the brake warning indicator.<br><br>Does the brake warning indicator illuminate for 3 seconds and then turn OFF?                               | System OK            | Go to <b>Step 2</b> |

### BRAKE WARNING INDICATOR INOPERATIVE

#### Brake Warning Indicator Inoperative

| Step                                                                                                                                     | Action                                                                                                   | Yes                                                  | No                                       |
|------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|------------------------------------------------------|------------------------------------------|
| <b>Schematic Reference: Brake Warning System Schematics</b><br><b>Connector End View Reference: Hydraulic Brakes Connector End Views</b> |                                                                                                          |                                                      |                                          |
| 1                                                                                                                                        | Did you review the Brake Warning System Description and Operation and perform the necessary inspections? | Go to <b>Step 2</b>                                  | Go to <b>Symptoms - Hydraulic Brakes</b> |
| 2                                                                                                                                        | Verify a fault is present.<br>Does the system operate normally?                                          | Go to <b>Testing for Intermittent Conditions and</b> |                                          |

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|   |                                                                                                                                                                                                                                                                                                                         | <b>Poor<br/>Connections in<br/>Wiring Systems</b> | <b>Go to Step 3</b>  |
|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|----------------------|
| 3 | <ol style="list-style-type: none"> <li>1. Install a scan tool.</li> <li>2. Select the Instrument Panel Cluster Special Functions menu on the scan tool.</li> <li>3. Command the Brake Lamp On.</li> </ol> <p>Does the brake warning indicator illuminate?</p>                                                           | Go to <b>Step 4</b>                               | Go to <b>Step 15</b> |
| 4 | <ol style="list-style-type: none"> <li>1. Select Input 1 from the Body Control Module Data Display menu on the scan tool.</li> <li>2. Set the park brake while observing the Park Brake status on the scan tool.</li> </ol> <p>Does the Park Brake status change from Released to Set?</p>                              | Go to <b>Step 5</b>                               | Go to <b>Step 6</b>  |
| 5 | <ol style="list-style-type: none"> <li>1. Disconnect the brake fluid level switch harness connector.</li> <li>2. Connect a fused jumper wire between the brake fluid level switch output circuit and the ground circuit of the brake fluid level switch.</li> </ol> <p>Does the brake warning indicator illuminate?</p> | Go to <b>Step 12</b>                              | Go to <b>Step 7</b>  |
| 6 | <ol style="list-style-type: none"> <li>1. Disconnect the park brake switch harness connector.</li> <li>2. Connect a fused jumper wire between the park brake switch output circuit and a good ground.</li> </ol> <p>Does the brake warning indicator illuminate?</p>                                                    | Go to <b>Step 11</b>                              | Go to <b>Step 8</b>  |
| 7 | <p>Connect a fused jumper wire between the brake fluid level switch output circuit and a good ground.</p> <p>Does the brake warning indicator illuminate?</p>                                                                                                                                                           | Go to <b>Step 9</b>                               | Go to <b>Step 10</b> |
| 8 | <p>Test park brake switch output circuit for an open between the park brake switch and the BCM. Refer to <b>Circuit Testing</b> and <b>Wiring Repairs</b> in Wiring Systems.</p> <p>Did you find and correct the condition?</p>                                                                                         | Go to <b>Step 16</b>                              | Go to <b>Step 13</b> |

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|    |                                                                                                                                                                                                                                                                      |                      |                      |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------------|
| 9  | Repair the open in the ground circuit of the brake fluid level switch. Refer to <b>Wiring Repairs</b> in Wiring Systems.<br>Did you complete the repair?                                                                                                             | Go to <b>Step 16</b> | -                    |
| 10 | Test the brake fluid level switch input circuit for an open. Refer to <b>Circuit Testing</b> and <b>Wiring Repairs</b> in Wiring Systems.<br>Did you find and correct the condition?                                                                                 | Go to <b>Step 16</b> | Go to <b>Step 14</b> |
| 11 | Replace the park brake switch. Refer to <b>Park Brake Warning Lamp Switch Replacement</b> in Park Brake.<br>Did you complete the replacement?                                                                                                                        | Go to <b>Step 16</b> | -                    |
| 12 | Replace the brake fluid level switch. Refer to <b>Master Cylinder Reservoir Replacement</b> .<br>Did you complete the replacement?                                                                                                                                   | Go to <b>Step 16</b> | -                    |
| 13 | <b>IMPORTANT:</b><br>Perform the set up procedure for the BCM.<br><br>Replace the BCM. Refer to <b>Body Control Module Replacement</b> in Body Control System. Did you complete the replacement?                                                                     | Go to <b>Step 16</b> | -                    |
| 14 | <b>IMPORTANT:</b><br>Following EBCM replacement, use the scan tool to perform the Tire Size Calibration procedure.<br><br>Replace the EBCM. Refer to <b>Electronic Brake Control Module Replacement</b> in Anti-lock Brake System. Did you complete the replacement? | Go to <b>Step 16</b> | -                    |
| 15 | Replace the instrument panel cluster. Refer to <b>Instrument Panel Cluster (IPC) Replacement</b> in Instrument Panel, Gages, and Console.<br>Did you complete the replacement?                                                                                       | Go to <b>Step 16</b> | -                    |
| 16 | Verify the system is repaired.<br>Does the system operate normally?                                                                                                                                                                                                  | System OK            | Go to <b>Step 3</b>  |

### BRAKE PULSATION

#### Test Description

The numbers below refer to the step numbers on the diagnostic table:

**2:** Suspension components that are not operating properly may cause a disturbance to

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the vehicle during application of the brake system.

**3:** Anti-lock brake system operation could produce feedback through the brake pedal during application of the brake system.

### Brake Pulsation

| Step | Action                                                                                                                                                                                                 | Yes                 | No                                                        |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-----------------------------------------------------------|
| 1    | Were you sent here from the Hydraulic Brake Symptom table?                                                                                                                                             | Go to <b>Step 2</b> | Go to <b>Diagnostic Starting Point - Hydraulic Brakes</b> |
| 2    | Inspect the suspension system for proper operation. Refer to <b>Diagnostic Starting Point - Suspension General Diagnosis</b> in Suspension General Diagnosis.<br>Did you find and correct a condition? | Go to <b>Step 6</b> | Go to <b>Step 3</b>                                       |
| 3    | Inspect the anti-lock brake system for proper operation. Refer to <b>Diagnostic Starting Point - Anti-lock Brake System</b> in Anti-lock Brake System.<br>Did you find and correct a condition?        | Go to <b>Step 6</b> | Go to <b>Step 4</b>                                       |
| 4    | Inspect the disc brake system for proper operation. Refer to <b>Disc Brake System Diagnosis</b> .<br>Did you find and correct a condition?                                                             | Go to <b>Step 6</b> | Go to <b>Step 5</b>                                       |
| 5    | Inspect the hydraulic brake system for proper operation. Refer to <b>Hydraulic Brake System Diagnosis</b> .<br>Did you find and correct a condition?                                                   | Go to <b>Step 6</b> | Go to <b>Diagnostic Starting Point - Hydraulic Brakes</b> |
| 6    | Road test the vehicle in order to confirm proper operation. Refer to <b>Brake System Vehicle Road Test</b> .<br>Is the condition still present?                                                        | Go to <b>Step 2</b> | System OK                                                 |

### BRAKE SYSTEM NOISE

#### Brake System Noise

| Step | Action                                                     | Yes                 | No                                                        |
|------|------------------------------------------------------------|---------------------|-----------------------------------------------------------|
| 1    | Were you sent here from the Hydraulic Brake Symptom table? | Go to <b>Step 2</b> | Go to <b>Diagnostic Starting Point - Hydraulic Brakes</b> |
|      | Inspect the disc brake system for proper                   |                     |                                                           |

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|   |                                                                                                                                                             |                     |                                                           |
|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-----------------------------------------------------------|
| 2 | operation. Refer to <b><u>Disc Brake System Diagnosis</u></b> .<br>Did you find and correct a condition?                                                    | Go to <b>Step 6</b> | System OK                                                 |
| 3 | Inspect the brake assist system for proper operation. Refer to <b><u>Brake Assist System Diagnosis</u></b> .<br>Did you find and correct a condition?       | Go to <b>Step 6</b> | Go to <b>Step 4</b>                                       |
| 4 | Inspect the hydraulic brake system for proper operation. Refer to <b><u>Hydraulic Brake System Diagnosis</u></b> .<br>Did you find and correct a condition? | Go to <b>Step 6</b> | Go to <b>Step 5</b>                                       |
| 5 | Inspect the park brake system for proper operation. Refer to <b><u>Park Brake System Diagnosis</u></b> .<br>Did you find and correct a condition?           | Go to <b>Step 6</b> | Go to <b>Diagnostic Starting Point - Hydraulic Brakes</b> |
| 6 | Road test the vehicle in order to confirm proper operation. Refer to <b><u>Brake System Vehicle Road Test</u></b> .<br>Is the condition still present?      | Go to <b>Step 2</b> | System OK                                                 |

### BRAKING ACTION UNEVEN - PULLS TO ONE SIDE

#### Test Description

The numbers below refer to the step numbers on the diagnostic table:

**2:** Suspension components that are not operating properly may cause a disturbance to the vehicle during application of the brake system.

**3:** Steering components that are not operating properly may cause a disturbance to the vehicle during application of the brake system.

#### Braking Action Uneven - Pulls to One Side

| Step | Action                                                                                                                                                                                                        | Yes                 | No                                                        |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-----------------------------------------------------------|
| 1    | Were you sent here from the Hydraulic Brake Symptom table?                                                                                                                                                    | Go to <b>Step 2</b> | Go to <b>Diagnostic Starting Point - Hydraulic Brakes</b> |
| 2    | Inspect the suspension system for proper operation. Refer to <b><u>Diagnostic Starting Point - Suspension General Diagnosis</u></b> in Suspension General Diagnosis.<br>Did you find and correct a condition? | Go to <b>Step 6</b> | Go to <b>Step 3</b>                                       |
|      | Inspect the steering system for proper                                                                                                                                                                        |                     |                                                           |

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|   |                                                                                                                                                                                  |                     |                     |
|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------------|
| 3 | operation. Refer to <b>Diagnostic Starting Point - Power Steering System (w/o Electro-Hydraulic Steering)</b> in Power Steering System.<br>Did you find and correct a condition? | Go to <b>Step 6</b> | Go to <b>Step 4</b> |
| 4 | Inspect the hydraulic brake system for proper operation. Refer to <b>Hydraulic Brake System Diagnosis</b> .<br>Did you find and correct a condition?                             | Go to <b>Step 6</b> | Go to <b>Step 5</b> |
| 5 | Inspect the disc brake system for proper operation. Refer to <b>Disc Brake System Diagnosis</b> .<br>Did you find and correct a condition?                                       | Go to <b>Step 6</b> | Go to <b>Step 5</b> |
| 6 | Road test the vehicle in order to confirm proper operation. Refer to <b>Brake System Vehicle Road Test</b> .<br>Is the condition still present?                                  | Go to <b>Step 2</b> | System OK           |

**BRAKING ACTION UNEVEN - FRONT TO REAR****Test Description**

The number below refer to the step number on the diagnostic table:

**2:** Suspension components that are not operating properly may cause a disturbance to the vehicle during application of the brake system.

**Braking Action Uneven - Front to Rear**

| Step | Action                                                                                                                                                                                                 | Yes                 | No                                                        |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-----------------------------------------------------------|
| 1    | Were you sent here from the Hydraulic Brake Symptom table?                                                                                                                                             | Go to <b>Step 2</b> | Go to <b>Diagnostic Starting Point - Hydraulic Brakes</b> |
| 2    | Inspect the suspension system for proper operation. Refer to <b>Diagnostic Starting Point - Suspension General Diagnosis</b> in Suspension General Diagnosis.<br>Did you find and correct a condition? | Go to <b>Step 6</b> | Go to <b>Step 3</b>                                       |
| 3    | Inspect the hydraulic brake system for proper operation. Refer to <b>Hydraulic Brake System Diagnosis</b> .<br>Did you find and correct a condition?                                                   | Go to <b>Step 6</b> | Go to <b>Step 4</b>                                       |
|      | Inspect the disc brake system for proper                                                                                                                                                               |                     |                                                           |

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|   |                                                                                                                                                        |                     |                                                                  |
|---|--------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------------------------------------------------------------------|
| 4 | operation. Refer to <b><u>Disc Brake System Diagnosis</u></b> .<br>Did you find and correct a condition?                                               | Go to <b>Step 6</b> | Go to <b>Step 5</b>                                              |
| 5 | Inspect the brake assist system for proper operation. Refer to <b><u>Brake Assist System Diagnosis</u></b> .<br>Did you find and correct a condition?  | Go to <b>Step 6</b> | Go to <b><u>Diagnostic Starting Point - Hydraulic Brakes</u></b> |
| 6 | Road test the vehicle in order to confirm proper operation. Refer to <b><u>Brake System Vehicle Road Test</u></b> .<br>Is the condition still present? | Go to <b>Step 2</b> | System OK                                                        |

**BRAKE PEDAL EXCESSIVE TRAVEL****Brake Pedal Excessive Travel**

| Step | Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Yes                 | No                                                               |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------------------------------------------------------------------|
| 1    | Were you sent here from the Hydraulic Brake Symptom Table?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Go to <b>Step 2</b> | Go to <b><u>Diagnostic Starting Point - Hydraulic Brakes</u></b> |
| 2    | Inspect for proper brake pedal travel. Refer to <b><u>Brake Pedal Travel Measurement and Inspection</u></b> .<br>Is the brake pedal travel distance within the acceptable limits?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Go to <b>Step 5</b> | Go to <b>Step 3</b>                                              |
| 3    | <ol style="list-style-type: none"><li>Inspect for worn, missing, misaligned, bent or damaged brake pedal system components.<ul style="list-style-type: none"><li>For the brake pedal pushrod component inspection, refer to <b><u>Brake Pedal Pushrod Inspection</u></b>.</li><li>Inspect the brake pedal bushings for excessive wear and/or damage and inspect the brake pedal for a bent and/or damaged condition.</li></ul></li><li>Replace the brake pedal system components that are worn, missing, misaligned, bent or damaged, refer to the following procedure(s) as necessary.<ul style="list-style-type: none"><li><b><u>Brake Pedal Assembly Replacement</u></b></li></ul></li></ol> |                     |                                                                  |

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## 2004 Chevrolet Blazer

2004 BRAKES Hydraulic Brakes - Blazer/S10, Jimmy/Sonoma

|   |                                                                                                                                                                                                                                           |                     |                                                           |
|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-----------------------------------------------------------|
|   | <ul style="list-style-type: none"> <li>• <b>Vacuum Brake Booster Replacement</b> (for pedal pushrod replacement)</li> </ul> <p>Did you find and replace any worn, missing, misaligned, bent or damaged brake pedal system components?</p> | Go to <b>Step 4</b> | Go to <b>Step 5</b>                                       |
| 4 | <p>Reinspect for proper brake pedal travel. Refer to <b>Brake Pedal Travel Measurement and Inspection</b>.</p> <p>Is the brake pedal travel distance within the acceptable limits?</p>                                                    | Go to <b>Step 8</b> | Go to <b>Step 5</b>                                       |
| 5 | <p>Inspect the hydraulic brake system for proper operation. Refer to <b>Hydraulic Brake System Diagnosis</b>.</p> <p>Did you find and correct a condition?</p>                                                                            | Go to <b>Step 8</b> | Go to <b>Step 6</b>                                       |
| 6 | <p>Inspect the disc brake system for proper operation. Refer to <b>Disc Brake System Diagnosis</b>.</p> <p>Did you find and correct a condition?</p>                                                                                      | Go to <b>Step 8</b> | Go to <b>Step 7</b>                                       |
| 7 | <p>Inspect the brake assist system for proper operation. Refer to <b>Brake Assist System Diagnosis</b>.</p> <p>Did you find and correct a condition?</p>                                                                                  | Go to <b>Step 8</b> | Go to <b>Diagnostic Starting Point - Hydraulic Brakes</b> |
| 8 | <p>Road test the vehicle to confirm proper operation. Refer to <b>Brake System Vehicle Road Test</b>.</p> <p>Is the condition still present?</p>                                                                                          | Go to <b>Step 2</b> | System OK                                                 |

### BRAKE PEDAL EXCESSIVE EFFORT

#### Brake Pedal Excessive Effort

| Step | Action                                                                                                                                                   | Yes                 | No                                                        |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-----------------------------------------------------------|
| 1    | Were you sent here from the Hydraulic Brake Symptom table?                                                                                               | Go to <b>Step 2</b> | Go to <b>Diagnostic Starting Point - Hydraulic Brakes</b> |
| 2    | <p>Inspect the brake assist system for proper operation. Refer to <b>Brake Assist System Diagnosis</b>.</p> <p>Did you find and correct a condition?</p> | Go to <b>Step 4</b> | Go to <b>Step 3</b>                                       |
|      |                                                                                                                                                          |                     |                                                           |

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2004 BRAKES Hydraulic Brakes - Blazer/S10, Jimmy/Sonoma

|   |                                                                                                                                                      |                     |                     |
|---|------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------------|
| 3 | Inspect the hydraulic brake system for proper operation. Refer to <b>Hydraulic Brake System Diagnosis</b> .<br>Did you find and correct a condition? | Go to <b>Step 4</b> | Go to <b>Step 3</b> |
| 4 | Road test the vehicle to confirm proper operation. Refer to <b>Brake System Vehicle Road Test</b> .<br>Is the condition still present?               | Go to <b>Step 2</b> | System OK           |

**BRAKES DRAG****Brakes Drag**

| Step | Action                                                                                                                                               | Yes                 | No                                                        |
|------|------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-----------------------------------------------------------|
| 1    | Were you sent here from the Hydraulic Brake Symptom table?                                                                                           | Go to <b>Step 3</b> | Go to <b>Diagnostic Starting Point - Hydraulic Brakes</b> |
| 2    | Inspect the park brake system for proper operation. Refer to <b>Park Brake System Diagnosis</b> .<br>Did you find and correct a condition?           | Go to <b>Step 5</b> | Go to <b>Step 3</b>                                       |
| 3    | Inspect the disc brake system for proper operation. Refer to <b>Disc Brake System Diagnosis</b> .<br>Did you find and correct a condition?           | Go to <b>Step 5</b> | Go to <b>Step 4</b>                                       |
| 4    | Inspect the hydraulic brake system for proper operation. Refer to <b>Hydraulic Brake System Diagnosis</b> .<br>Did you find and correct a condition? | Go to <b>Step 5</b> | Go to <b>Diagnostic Starting Point - Hydraulic Brakes</b> |
| 5    | Road test the vehicle in order to confirm proper operation. Refer to <b>Brake System Vehicle Road Test</b> .<br>Is the condition still present?      | Go to <b>Step 2</b> | System OK                                                 |

**BRAKE SYSTEM SLOW RELEASE****Brake System Slow Release**

| Step | Action                                                     | Yes                 | No                                                        |
|------|------------------------------------------------------------|---------------------|-----------------------------------------------------------|
| 1    | Were you sent here from the Hydraulic Brake Symptom table? | Go to <b>Step 2</b> | Go to <b>Diagnostic Starting Point - Hydraulic Brakes</b> |
|      | Inspect the hydraulic brake system for                     |                     |                                                           |

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2004 BRAKES Hydraulic Brakes - Blazer/S10, Jimmy/Sonoma

|   |                                                                                                                                                |                     |                                                           |
|---|------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-----------------------------------------------------------|
| 2 | proper operation. Refer to <b>Hydraulic Brake System Diagnosis</b> .<br>Did you find and correct a condition?                                  | Go to <b>Step 5</b> | Go to <b>Step 3</b>                                       |
| 3 | Inspect the brake assist system for proper operation. Refer to <b>Brake Assist System Diagnosis</b> .<br>Did you find and correct a condition? | Go to <b>Step 5</b> | Go to <b>Step 4</b>                                       |
| 4 | Inspect the disc brake system for proper operation. Refer to <b>Disc Brake System Diagnosis</b> .<br>Did you find and correct a condition?     | Go to <b>Step 5</b> | Go to <b>Diagnostic Starting Point - Hydraulic Brakes</b> |
| 5 | Road test the vehicle to confirm proper operation. Refer to <b>Brake System Vehicle Road Test</b> .<br>Is the condition still present?         | Go to <b>Step 2</b> | System OK                                                 |

**BRAKE FLUID LOSS****Brake Fluid Loss**

| Step | Action                                                                                                                                               | Yes                 | No                                                        |
|------|------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-----------------------------------------------------------|
| 1    | Were you sent here from the Hydraulic Brake Symptom table?                                                                                           | Go to <b>Step 2</b> | Go to <b>Diagnostic Starting Point - Hydraulic Brakes</b> |
| 2    | Inspect the brake assist system for proper operation. Refer to <b>Brake Assist System Diagnosis</b> .<br>Did you find and correct a condition?       | Go to <b>Step 4</b> | Go to <b>Step 3</b>                                       |
| 3    | Inspect the hydraulic brake system for proper operation. Refer to <b>Hydraulic Brake System Diagnosis</b> .<br>Did you find and correct a condition? | Go to <b>Step 4</b> | Go to <b>Step 3</b>                                       |
| 4    | Road test the vehicle to confirm proper operation. Refer to <b>Brake System Vehicle Road Test</b> .<br>Is the condition still present?               | Go to <b>Step 2</b> | System OK                                                 |

**DISC BRAKE SYSTEM DIAGNOSIS****Test Description**

The numbers below refer to the step numbers on the diagnostic table:

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**9:** Lubricant leaks from non-brake system components may come in contact with and contaminate brake system components.

**10:** Lubricant leaks from non-brake system components may come in contact with and contaminate brake system components.

**12:** Disc brake rotor shields/backing plates that come in contact with disc brake rotors may cause brake system noise.

### Disc Brake System Diagnosis

| Step                                                                                                                                                                                                                                                                                             | Action                                                                                                                                                                                                                                                                                                                                                                                                                                | Yes          | No                                                               |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|------------------------------------------------------------------|
| DEFINITION: This diagnostic table is designed to diagnose ONLY the components of the DISC brake system in order to determine if the DISC brake system is operating properly. You will be directed by the appropriate Symptom Table to go to other brake system diagnostic tables as appropriate. |                                                                                                                                                                                                                                                                                                                                                                                                                                       |              |                                                                  |
| 1                                                                                                                                                                                                                                                                                                | Were you sent here from a Brake Symptom Table?                                                                                                                                                                                                                                                                                                                                                                                        | Go to Step 2 | Go to <b><u>Diagnostic Starting Point - Hydraulic Brakes</u></b> |
| 2                                                                                                                                                                                                                                                                                                | Visually inspect the disc brake pads for the following: <ul style="list-style-type: none"> <li>• Lining thickness</li> <li>• Uneven and/or abnormal wear (edge-to-edge and/or side-to-side)</li> <li>• Evidence of contamination from an external substance</li> <li>• Looseness or damage (including pad hardware)</li> </ul> Did you find any conditions to indicate a concern with any of the (front and/or rear) disc brake pads? | Go to Step 3 | Go to Step 12                                                    |
| 3                                                                                                                                                                                                                                                                                                | Are any of the (front and/or rear) disc brake pads contaminated?                                                                                                                                                                                                                                                                                                                                                                      | Go to Step 8 | Go to Step 4                                                     |
| 4                                                                                                                                                                                                                                                                                                | Are any of the (front and/or rear) disc brake pads worn unevenly?                                                                                                                                                                                                                                                                                                                                                                     | Go to Step 7 | Go to Step 5                                                     |
| 5                                                                                                                                                                                                                                                                                                | Are any of the (front and/or rear) disc brake pads and/or pad hardware loose or damaged?                                                                                                                                                                                                                                                                                                                                              | Go to Step 7 | Go to Step 6                                                     |
|                                                                                                                                                                                                                                                                                                  | 1. Remove and inspect the worn disc brake pads for glazing, looseness, heat spots                                                                                                                                                                                                                                                                                                                                                     |              |                                                                  |

## 2004 Chevrolet Blazer

2004 BRAKES Hydraulic Brakes - Blazer/S10, Jimmy/Sonoma

|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                      |   |
|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|---|
| 6 | <p>or damage.</p> <p>2. Replace the worn disc brake pads as a complete axle set. Refer to <b><u>Brake Pads Replacement - Rear</u></b> , in Disc Brakes.</p> <p>Did you complete the inspection and replacement?</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Go to <b>Step 12</b> | - |
| 7 | <p><b>NOTE:</b><br/>Support the brake caliper with heavy mechanic's wire, or equivalent, whenever it is separated from its mount and the hydraulic flexible brake hose is still connected. Failure to support the caliper in this manner will cause the flexible brake hose to bear the weight of the caliper, which may cause damage to the brake hose and in turn may cause a brake fluid leak.</p> <p>1. Remove the (front and/or rear) disc brake calipers (as appropriate) from the mounting brackets and support the calipers. Do NOT disconnect the hydraulic brake flex hoses from the calipers. Refer to <b><u>Brake Caliper Replacement - Rear</u></b> in Disc Brakes.</p> <p>2. Inspect the disc brake caliper mounting bracket and the mounting/sliding hardware for the following conditions:</p> <p>Refer to <b><u>Disc Brake Mounting and Hardware Inspection - Rear</u></b> in Disc Brakes.</p> <ul style="list-style-type: none"> <li>• Loose, bent, cracked, or damaged caliper mounting bracket</li> <li>• Binding or seized hardware</li> <li>• Worn, damaged or missing hardware components</li> </ul> <p>3. Replace components as required.</p> <p>Refer to the following procedures in Disc Brakes, as required:</p> <ul style="list-style-type: none"> <li>• <b><u>Brake Caliper Bracket Replacement - Front</u></b></li> </ul> |                      | - |

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2004 BRAKES Hydraulic Brakes - Blazer/S10, Jimmy/Sonoma

|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                      |                     |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|---------------------|
|   | <ul style="list-style-type: none"> <li>• <b><u>Brake Caliper Bracket Replacement - Rear</u></b> , if equipped</li> <li>• <b><u>Disc Brake Hardware Replacement - Front (Dual Piston) Disc Brake Hardware Replacement - Front (Single Piston)</u></b></li> <li>• <b><u>Disc Brake Hardware Replacement - Rear</u></b> , if equipped</li> </ul> <p>4. Replace the unevenly-worn, loose or damaged disc brake pads as a complete axle set. Refer to <b><u>Brake Pads Replacement - Rear</u></b> in Disc Brakes.</p> <p>Did you complete the inspection and replacement?</p>                                                                                                                                        | Go to <b>Step 12</b> |                     |
| 8 | <p>1. Inspect the disc brake calipers, brake hoses and brake pipes for evidence of an external brake fluid leak.</p> <p>2. Replace any components found to be leaking brake fluid.</p> <p>Refer to the following procedures as required:</p> <ul style="list-style-type: none"> <li>• <b><u>Brake Caliper Replacement - Front (Dual Piston)</u></b> in Disc Brakes</li> <li>• <b><u>Brake Caliper Replacement - Rear</u></b> in Disc Brakes</li> <li>• <b><u>Brake Hose Replacement - Front</u></b></li> <li>• <b><u>Brake Hose Replacement - Rear</u></b></li> <li>• <b><u>Brake Pipe Replacement</u></b></li> </ul> <p>Did you find and correct the source of the leak causing contamination of the pads?</p> | Go to <b>Step 11</b> | Go to <b>Step 9</b> |
|   | <p>1. Inspect the wheel drive shaft outer seals (boots), if equipped, for damage and evidence of a grease leak.</p> <p>2. Replace any wheel drive shaft seal (boot) that is found to be leaking grease</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                      |                     |

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## 2004 Chevrolet Blazer

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|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                      |                      |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------------|
| 9  | <p>which may be the source of the contamination to the pads. Refer to <b><u>Wheel Drive Shaft Outer Joint and Seal Replacement</u></b> , if equipped, in Wheel Drive Shafts.</p> <p>3. Inspect the rear axle seals for damage and evidence of a lubricant leak.</p> <p>4. Replace any rear axle seal that is found to be leaking lubricant which may be the source of the contamination to the pads. Refer to <b><u>Rear Axle Shaft Seal and/or Bearing Replacement</u></b> in Rear Drive Axle.</p> <p>Did you find and correct the source of the leak causing contamination of the pads?</p>                                                                                                                                                       | Go to <b>Step 11</b> | Go to <b>Step 10</b> |
| 10 | <p>1. Inspect the following systems for damage and evidence of an external fluid leak.</p> <p>2. Replace any components found to be leaking fluid which may be the source of the contamination to the pads.</p> <p>Refer to the following procedures:</p> <ul style="list-style-type: none"> <li>• <b><u>Diagnostic Starting Point - Power Steering System (w/o Electro-Hydraulic Steering)</u></b> in Power Steering System</li> <li>• <b><u>Diagnostic Starting Point - Engine Mechanical</u></b> in Engine Mechanical - 4.3L</li> <li>• <b><u>Diagnostic Starting Point - Automatic Transmission</u></b> in Automatic Transmission - 4L60-E</li> </ul> <p>Did you find and correct the source of the leak causing contamination of the pads?</p> | Go to <b>Step 11</b> | -                    |
|    | <p>1. Clean the remaining disc brake system components to remove any traces of the contaminant.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                      |                      |

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**NOTE:**

Support the brake caliper with heavy mechanic's wire, or equivalent, whenever it is separated from its mount and the hydraulic flexible brake hose is still connected. Failure to support the caliper in this manner will cause the flexible brake hose to bear the weight of the caliper, which may cause damage to the brake hose and in turn may cause a brake fluid leak.

2. Remove the (front and/or rear) disc brake calipers (as appropriate) from the mounting brackets and support the calipers. Do NOT disconnect the hydraulic brake flex hoses from the calipers. Refer to **Brake Caliper Replacement - Rear** in Disc Brakes.
3. Inspect the disc brake caliper mounting/sliding hardware for the following conditions:

Refer to **Disc Brake Mounting and Hardware Inspection - Rear** in Disc Brakes.

- Binding or seized hardware
  - Distorted, worn, damaged or missing hardware components
4. Replace the caliper mounting/sliding hardware components as required. Refer to **Disc Brake Hardware Replacement - Front (Dual Piston) Disc Brake Hardware Replacement - Front (Single Piston)** , or **Disc Brake Hardware Replacement - Rear** , if equipped, in Disc Brakes.
  5. Replace the contaminated disc brake pads as a complete axle set. Refer to **Brake Pads Replacement - Front (Single Piston Caliper)** , and/or **Brake Pads Replacement - Rear** , if equipped, in Disc Brakes.

11

-

Did you complete the cleaning, inspection

Go to **Step 12**

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2004 BRAKES Hydraulic Brakes - Blazer/S10, Jimmy/Sonoma

|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                      |                      |
|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------------|
|    | and replacement?                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                      |                      |
| 12 | <p>Visually inspect each of the disc brake rotor shields/backing plates for evidence of contact with the brake rotors.</p> <p>Are any of the brake rotor shields/backing plates contacting the brake rotors?</p>                                                                                                                                                                                                                                                             | Go to <b>Step 13</b> | Go to <b>Step 14</b> |
| 13 | <p>Repair or replace the disc brake rotor shield/backing plate as required. Refer to <b><u>Disc Brake Splash Shield Replacement - Front</u></b> and/or <b><u>Disc Brake Backing Plate Replacement - Rear</u></b> , if equipped, in Disc Brakes.</p> <p>Did you complete the repair or replacement?</p>                                                                                                                                                                       | Go to <b>Step 14</b> | -                    |
| 14 | <p>1. Check the thickness of each of the disc brake rotors.</p> <p><b>IMPORTANT:</b><br/>Make the following determination AND ANSWER the question INDIVIDUALLY for EACH rotor.</p> <p>2. Make a determination for each brake rotor if the rotor can be REFINISHED and REMAIN ABOVE the minimum requirements.</p> <p>Refer to <b><u>Brake Rotor Thickness Measurement</u></b> in Disc Brakes. Does the disc brake rotor meet the minimum requirements for REFINISHING?</p>    | Go to <b>Step 15</b> | Go to <b>Step 17</b> |
|    | <p>1. Inspect each of the disc brake rotors for the following surface and wear conditions:</p> <p>Refer to <b><u>Brake Rotor Surface and Wear Inspection</u></b> in Disc Brakes.</p> <ul style="list-style-type: none"> <li>• Braking Surface Conditions <ul style="list-style-type: none"> <li>■ Heavy rust and/or pitting</li> <li>■ Cracks and/or heat spots</li> <li>■ Excessive blueing discoloration</li> </ul> </li> <li>• Braking Surface Wear Conditions</li> </ul> |                      |                      |

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|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                      |                      |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------------|
| 15 | <ul style="list-style-type: none"> <li>■ Deep or excessive scoring beyond maximum acceptable level</li> <li>■ Lateral runout beyond maximum acceptable level</li> <li>■ Thickness variation beyond maximum acceptable level</li> </ul> <p><b>IMPORTANT:</b><br/>Make the following determination AND ANSWER the question INDIVIDUALLY for EACH rotor.</p> <p>2. Make a determination for each brake rotor if the rotor requires refinishing based upon the results of the inspection.</p> <p>If the brake rotor exhibits any of the following conditions, it requires refinishing.</p> <ul style="list-style-type: none"> <li>● Rotor exhibits one or more of the Braking Surface Conditions listed previously</li> <li>● Rotor is beyond the acceptable level in one or more of the Braking Surface Wear Conditions listed previously</li> </ul> <p>Does the brake rotor require REFINISHING?</p> | Go to <b>Step 16</b> | Go to <b>Step 20</b> |
| 16 | <p>1. Refinish the brake rotor. Refer to <b><u>Brake Rotor Refinishing</u></b> in Disc Brakes.</p> <p>2. Inspect the brake rotor thickness. Refer to <b><u>Brake Rotor Thickness Measurement</u></b> in Disc Brakes.</p> <p>Were you able to REFINISH the brake rotor within the minimum requirements?</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Go to <b>Step 20</b> | Go to <b>Step 19</b> |
| 17 | <p>Is the brake rotor at or below the DISCARD requirements?</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Go to <b>Step 19</b> | Go to <b>Step 18</b> |
|    | <p>1. Inspect each of the disc brake rotors for the following surface and wear conditions:</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                      |                      |

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|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                      |                      |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------------|
| 18 | <p>Refer to <b><u>Brake Rotor Surface and Wear Inspection</u></b> in Disc Brakes.</p> <ul style="list-style-type: none"> <li>• Braking Surface Conditions <ul style="list-style-type: none"> <li>■ Heavy rust and/or pitting</li> <li>■ Cracks and/or heat spots</li> <li>■ Excessive blueing discoloration</li> </ul> </li> <li>• Braking Surface Wear Conditions <ul style="list-style-type: none"> <li>■ Deep or excessive scoring beyond maximum acceptable level</li> <li>■ Lateral runout beyond maximum acceptable level</li> <li>■ Thickness variation beyond maximum acceptable level</li> </ul> </li> </ul> <p><b>IMPORTANT:</b><br/>Make the following determination AND ANSWER the question INDIVIDUALLY for EACH rotor.</p> <p>2. Make a determination for each brake rotor if the rotor requires replacement based upon the results of the inspection.</p> <p>If a brake rotor exhibits any of the following conditions, it requires replacement.</p> <ul style="list-style-type: none"> <li>• Rotor exhibits one or more of the Braking Surface Conditions listed previously</li> <li>• Rotor is beyond the acceptable level in one or more of the Braking Surface Wear Conditions listed previously</li> </ul> <p>Does the brake rotor require REPLACEMENT?</p> | Go to <b>Step 19</b> | Go to <b>Step 20</b> |
|    | Replace the brake rotor. Refer to <b><u>Brake Rotor Replacement - Front</u></b> or <b><u>Brake Rotor</u></b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                      |                      |

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2004 BRAKES Hydraulic Brakes - Blazer/S10, Jimmy/Sonoma

|    |                                                                                                                      |                                                 |   |
|----|----------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|---|
| 19 | <b>Replacement - Rear</b> , if equipped in Disc Brakes.<br>Did you complete the replacement?                         | Go to <b>Step 20</b>                            | - |
| 20 | Install or connect components that were removed or disconnected during diagnosis.<br>Did you complete the operation? | Disc Brake System OK<br>Return to Symptom Table | - |

### HYDRAULIC BRAKE SYSTEM DIAGNOSIS

#### Hydraulic Brake System Diagnosis

| Step                                                                                                                                                                                                                                                                                                       | Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Yes                 | No                                                               |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------------------------------------------------------------------|
| DEFINITION: This diagnostic table is designed to diagnose ONLY the components of the HYDRAULIC brake system in order to determine if the HYDRAULIC brake system is operating properly. You will be directed by the appropriate Symptom table to go to other brake system diagnostic tables as appropriate. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                     |                                                                  |
| 1                                                                                                                                                                                                                                                                                                          | Were you sent here from a Brake Symptom table?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Go to <b>Step 2</b> | Go to <b><u>Diagnostic Starting Point - Hydraulic Brakes</u></b> |
| 2                                                                                                                                                                                                                                                                                                          | Inspect and adjust the brake fluid level in the brake master cylinder. Refer to <b><u>Master Cylinder Reservoir Filling</u></b> .<br>Was the brake fluid level low?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Go to <b>Step 3</b> | Go to <b>Step 4</b>                                              |
| 3                                                                                                                                                                                                                                                                                                          | <ol style="list-style-type: none"> <li>Inspect the brake fluid for the following conditions, indicating brake fluid contamination: <ul style="list-style-type: none"> <li>Fluid separation, indicating two types of fluid are present <ul style="list-style-type: none"> <li>Swirled appearance - oil-based substance</li> <li>Layered appearance - silicone-based substance</li> </ul> </li> <li>Fluid discoloration <ul style="list-style-type: none"> <li>Cloudy appearance - moisture</li> <li>Dark appearance/ suspended particles in fluid - dirt, rust, corrosion, brake dust</li> </ul> </li> </ul> </li> <li>Inspect the master cylinder reservoir cap</li> </ol> |                     |                                                                  |

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## 2004 Chevrolet Blazer

2004 BRAKES Hydraulic Brakes - Blazer/S10, Jimmy/Sonoma

|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                     |                      |
|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|----------------------|
|   | diaphragm and the reservoir-to-master cylinder grommets for swelling, indicating fluid contamination.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                     |                      |
|   | Do any of the above conditions exist?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Go to <b>Step 5</b> | Go to <b>Step 6</b>  |
| 4 | <ol style="list-style-type: none"> <li>Inspect the brake fluid for the following conditions, indicating brake fluid contamination: <ul style="list-style-type: none"> <li>Fluid separation, indicating two types of fluid are present <ul style="list-style-type: none"> <li>Swirled appearance - oil-based substance</li> <li>Layered appearance - silicone-based substance</li> </ul> </li> <li>Fluid discoloration <ul style="list-style-type: none"> <li>Cloudy appearance - moisture</li> <li>Dark appearance/ suspended particles in fluid - dirt, rust, corrosion, brake dust</li> </ul> </li> </ul> </li> <li>Inspect the master cylinder reservoir cap diaphragm and the reservoir-to-master cylinder grommets for swelling, indicating fluid contamination.</li> </ol> |                     |                      |
|   | Do any of the above conditions exist?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Go to <b>Step 5</b> | Go to <b>Step 12</b> |
|   | <ol style="list-style-type: none"> <li>Flush the hydraulic brake system. Refer to <b>Hydraulic Brake System Flushing</b>.</li> <li>If the brake fluid WAS contaminated with an oil-based or a silicone-based fluid, indicated by fluid separation and/or a swollen master cylinder reservoir cap diaphragm and/or swollen reservoir-to-master cylinder grommets, perform the following steps. Refer to the procedures indicated. <ol style="list-style-type: none"> <li>Remove ALL of the following components listed. Each component contains internal rubber seals/linings which have been contaminated.</li> </ol> </li> </ol>                                                                                                                                                |                     |                      |

5

2. Clean out the hydraulic brake pipes using denatured alcohol, or equivalent.
3. Dry the brake pipes using non-lubricated, filtered air.
4. Repair or replace ALL of the following components listed. Each component contains internal rubber seals/linings which have been contaminated.
  - **Master Cylinder Overhaul** or **Master Cylinder Replacement**
  - Brake master cylinder reservoir: Clean the brake master cylinder reservoir using denatured alcohol, or equivalent, then dry the reservoir using non-lubricated, filtered air, or if necessary, replace the brake master cylinder reservoir.
  - Replace the brake master cylinder reservoir cap diaphragm.
  - **Brake Hose Replacement - Front**
  - **Brake Hose Replacement - Rear**
  - **Brake Caliper Overhaul - Front (Single Piston) Brake Caliper Overhaul - Front (Dual Piston) or Brake Caliper Replacement - Front (Dual Piston) in Disc Brakes**
  - **Brake Caliper Overhaul - Rear or Brake Caliper Replacement - Rear**, if equipped, in Disc Brakes
  - **Brake Pressure Modulator**

-



**Valve (BPMV)**  
**Replacement** in Anti-lock  
 Brake System

3. If the brake fluid was NOT contaminated with an oil-based fluid, but WAS contaminated with water or dirt, rust, corrosion, and/or brake dust, replace the brake master cylinder reservoir cap diaphragm which may have allowed moisture or dirt to enter the system.
4. Refill and bleed the hydraulic brake system. Refer to **Hydraulic Brake System Bleeding (Manual)** or **Hydraulic Brake System Bleeding (Pressure)**.

Did you complete the operation and any required repairs and/or replacements?

Go to **Step 9**

6

1. Inspect the following hydraulic brake system components for external fluid leaks. Repair or replace any of the components found to be leaking brake fluid. Refer to the appropriate procedures:
  - **Master Cylinder Overhaul** or **Master Cylinder Replacement**

Brake master cylinder reservoir cap diaphragm

  - **Brake Hose Replacement - Front**
  - **Brake Hose Replacement - Rear**
  - **Brake Pipe Replacement**
  - **Brake Caliper Overhaul - Front (Single Piston) Brake Caliper Overhaul - Front (Dual Piston) or Brake Caliper Replacement - Front (Dual Piston)** in Disc Brakes
  - **Brake Caliper Overhaul - Rear or Brake Caliper Replacement -**

|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                      |                      |
|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------------|
|    | <p><b>Rear</b> , if equipped, in Disc Brakes</p> <ul style="list-style-type: none"> <li>• <b>Brake Pressure Modulator Valve (BPMV) Replacement</b> in Anti-lock Brake System</li> </ul> <p>2. If you repaired or replaced any of the brake system components listed, bleed the hydraulic brake system. Refer to <b>Hydraulic Brake System Bleeding (Manual)Hydraulic Brake System Bleeding (Pressure)</b>. While bleeding the hydraulic brake system, observe for the following conditions:</p> <ul style="list-style-type: none"> <li>• The presence of air in the system at a bleeder valve location other than at the repair location, except if the brake master cylinder was replaced</li> <li>• An unrestricted and even flow of brake fluid per axle during the bleeding procedure</li> </ul> |                      |                      |
|    | Did you find and correct a condition?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Go to <b>Step 7</b>  | Go to <b>Step 12</b> |
| 7  | Was there air in the system at a bleeder valve location other than at the repair location, except if the brake master cylinder was replaced?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Go to <b>Step 19</b> | Go to <b>Step 8</b>  |
| 8  | Was the flow of brake fluid unrestricted and even per axle during the bleeding procedure?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Go to <b>Step 9</b>  | Go to <b>Step 10</b> |
| 9  | Inspect the hydraulic function of the brake calipers/wheel cylinders for proper operation. Refer to <b>Hydraulic Brake Component Operation Visual Inspection</b> . Was the hydraulic function of the brake calipers/wheel cylinders operating properly?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Go to <b>Step 21</b> | Go to <b>Step 14</b> |
| 10 | Was the flow of brake fluid restricted or uneven through front axle hydraulic components during the bleeding procedure?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Go to <b>Step 13</b> | Go to <b>Step 11</b> |
| 11 | Was the flow of brake fluid restricted or uneven through rear axle hydraulic components during the bleeding procedure?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Go to <b>Step 17</b> | -                    |
|    | Inspect the hydraulic function of the brake calipers/wheel cylinders for proper operation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                      |                      |

# 2004 Chevrolet Blazer

2004 BRAKES Hydraulic Brakes - Blazer/S10, Jimmy/Sonoma

|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                      |                      |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------------|
| 12 | <p>Refer to <b>Hydraulic Brake Component Operation Visual Inspection</b>.</p> <p>Was the hydraulic function of the brake calipers/wheel cylinders operating properly?</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Go to <b>Step 15</b> | Go to <b>Step 13</b> |
| 13 | <p>Determine if the brake caliper is restricting the flow of brake fluid and/or not operating properly:</p> <ol style="list-style-type: none"> <li>1. Raise and support the vehicle. Refer to <b>Lifting and Jacking the Vehicle</b> in General Information.</li> <li>2. Remove the tire and wheel assemblies. Refer to <b>Tire and Wheel Removal and Installation</b> in Tires and Wheels.</li> <li>3. Open the suspected caliper bleeder valve.</li> <li>4. Using a large C-clamp, compress the caliper piston and observe for an unrestricted flow of brake fluid and for free movement of the caliper piston.</li> <li>5. Close the caliper bleeder valve.</li> </ol> <p>Was the flow of brake fluid unrestricted and did the caliper piston move freely?</p> | Go to <b>Step 17</b> | Go to <b>Step 14</b> |
| 14 | <p>Repair or replace any brake caliper/wheel cylinder that was not operating properly. Refer to the appropriate procedure.</p> <ul style="list-style-type: none"> <li>• <b>Brake Caliper Overhaul - Front (Single Piston) Brake Caliper Overhaul - Front (Dual Piston) or Brake Caliper Replacement - Front (Dual Piston)</b> in Disc Brakes</li> <li>• <b>Brake Caliper Overhaul - Rear or Brake Caliper Replacement - Rear</b>, if equipped, in Disc Brakes</li> </ul> <p>Did you complete the repair and/or replacement?</p>                                                                                                                                                                                                                                   | Go to <b>Step 21</b> | -                    |
|    | Bleed the hydraulic brake system to observe                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                      |                      |

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## 2004 Chevrolet Blazer

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|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                      |                      |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------------|
| 15 | for the presence of air in the system and to observe for an unrestricted and even flow of brake fluid per axle during the bleeding procedure. Refer to <b>Hydraulic Brake System Bleeding (Manual)</b> or <b>Hydraulic Brake System Bleeding (Pressure)</b> .<br>Was there air in the system?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Go to <b>Step 19</b> | Go to <b>Step 16</b> |
| 16 | Was the flow of brake fluid unrestricted and even per axle during the bleeding procedure?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Go to <b>Step 21</b> | Go to <b>Step 17</b> |
| 17 | <ol style="list-style-type: none"> <li>1. Inspect the hydraulic brake pipes and flexible brake hoses for signs of a fluid restriction; such as being bent, kinked, pinched or damaged. Refer to <b>Brake Pipe and Hose Inspection</b>.</li> <li>2. Replace any of the hydraulic brake pipes and/or flexible brake hoses found to be bent, kinked, pinched, or damaged. Refer to the following procedures as necessary: <ul style="list-style-type: none"> <li>• <b>Brake Hose Replacement - Front</b></li> <li>• <b>Brake Hose Replacement - Rear</b></li> <li>• <b>Brake Pipe Replacement</b></li> </ul> </li> <li>3. If none of the hydraulic brake pipes or flexible brake hoses were visibly bent, kinked, pinched, or damaged, replace the hydraulic brake flex hose at the restricted location.</li> </ol> <p>Did you find and correct a condition?</p> | Go to <b>Step 21</b> | Go to <b>Step 18</b> |
| 18 | Replace the brake pressure modulator valve (BPMV), in order to correct the hydraulic brake dynamic rear proportioning mechanical operation. Refer to <b>Brake Pressure Modulator Valve (BPMV) Replacement</b> in Anti-lock Brake System.<br>Did you complete the replacement?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Go to <b>Step 21</b> | -                    |
|    | <ol style="list-style-type: none"> <li>1. Inspect the hydraulic brake system components for brake fluid seepage at a seal and/or fitting location, which may have drawn air into the system.</li> <li>2. Inspect the hydraulic brake system</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                      |                      |

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|    |                                                                                                                                                                                                                                                                                                                                        |                                                                 |                         |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|-------------------------|
| 19 | <p>components for evidence of a recent repair, which may have introduced air into the system.</p> <p>3. Repair or replace any of the components found to be installed incorrectly or seeping brake fluid.</p>                                                                                                                          |                                                                 |                         |
|    | Did you find and correct a condition?                                                                                                                                                                                                                                                                                                  | Go to <b>Step 21</b>                                            | Go to <b>Step 20</b>    |
| 20 | <p>1. Inspect the brake master cylinder for internal fluid leaks. Refer to <b><u>Brake System Internal Leak Test</u></b>.</p> <p>2. Repair or replace the brake master cylinder if it is found to be leaking brake fluid internally. Refer to <b><u>Master Cylinder Overhaul</u></b> or <b><u>Master Cylinder Replacement</u></b>.</p> |                                                                 |                         |
|    | Did you find and correct a condition?                                                                                                                                                                                                                                                                                                  | Go to <b>Step 21</b>                                            | Return to Symptom Table |
| 21 | <p>Install or connect components that were removed or disconnected during diagnosis.</p> <p>Did you complete the operation?</p>                                                                                                                                                                                                        | <p>Hydraulic Brake System OK</p> <p>Return to Symptom Table</p> | -                       |

### BRAKE ASSIST SYSTEM DIAGNOSIS

#### Brake Assist System Diagnosis

| Step                                                                                                                                                                                                                                                                                                        | Action                                                                                                                                                                                      | Yes                 | No                                                               |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------------------------------------------------------------------|
| <b>DEFINITION:</b> This diagnostic table is designed to diagnose ONLY the components of the brake ASSIST system in order to determine if the brake ASSIST system is operating properly. You will be directed by the appropriate Symptom Table to go to other brake system diagnostic tables as appropriate. |                                                                                                                                                                                             |                     |                                                                  |
| 1                                                                                                                                                                                                                                                                                                           | Were you sent here from a Brake Symptom Table?                                                                                                                                              | Go to <b>Step 2</b> | Go to <b><u>Diagnostic Starting Point - Hydraulic Brakes</u></b> |
| 2                                                                                                                                                                                                                                                                                                           | <p>Inspect for proper brake pedal travel. Refer to <b><u>Brake Pedal Travel Measurement and Inspection</u></b>.</p> <p>Is the brake pedal travel distance within the acceptable limits?</p> | Go to <b>Step 5</b> | Go to <b>Step 3</b>                                              |
|                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                             |                     |                                                                  |

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|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                     |                                                                                               |
|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-----------------------------------------------------------------------------------------------|
| 3 | <p>1. Inspect for worn, missing, misaligned, bent or damaged brake pedal system components.</p> <ul style="list-style-type: none"> <li>• For the brake pedal pushrod component inspection, refer to <b><u>Brake Pedal Pushrod Inspection</u></b>.</li> <li>• Inspect the brake pedal bushings for excessive wear and/or damage and inspect the brake pedal for a misaligned, bent and/or damaged condition.</li> </ul> <p>2. Replace the brake pedal system components that are worn, missing, misaligned, bent or damaged, refer to the following procedures as necessary.</p> <ul style="list-style-type: none"> <li>• <b><u>Brake Pedal Assembly Replacement</u></b></li> <li>• <b><u>Vacuum Brake Booster Replacement</u></b> (for a bent or damaged pedal pushrod replacement)</li> </ul> <p>Did you find and replace any worn, missing, misaligned, bent or damaged brake pedal system components?</p> | Go to <b>Step 4</b> | Go to <b>Step 5</b>                                                                           |
| 4 | <p>Reinspect for proper brake pedal travel. Refer to <b><u>Brake Pedal Travel Measurement and Inspection</u></b>.</p> <p>Is the brake pedal travel distance within the acceptable limits?</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Go to <b>Step 8</b> | Go to <b>Step 5</b>                                                                           |
| 5 | <p>Check the engine vacuum source that supplies vacuum to the vacuum brake booster. Refer to <b><u>Brake System Vacuum Source Test</u></b>.</p> <p>Is the vacuum reading within the acceptable limits?</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Go to <b>Step 6</b> | Go to <b><u>Diagnostic Starting Point - Engine Mechanical</u></b> in Engine Mechanical - 4.3L |
| 6 | <p>During the vacuum source inspection, did the vacuum booster check valve operate properly?</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Go to <b>Step 8</b> | Go to <b>Step 7</b>                                                                           |

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|    |                                                                                                                                                                                                                                                                                                                                                                                                                                            |                      |                      |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------------|
| 7  | <p>Replace the vacuum booster check valve. Refer to <b><u>Vacuum Brake Booster Check Valve and/or Hose Replacement</u></b>.</p> <p>Did you complete the replacement?</p>                                                                                                                                                                                                                                                                   | Go to <b>Step 8</b>  | -                    |
| 8  | <ol style="list-style-type: none"> <li>1. Pump the brake pedal several times until the brake pedal becomes hard.</li> <li>2. Maintain moderate foot pressure on the brake pedal and start the engine. Observe pedal operation.</li> </ol> <p>Did the brake pedal drop slightly, then remain firm after the engine was started?</p>                                                                                                         | Go to <b>Step 9</b>  | Go to <b>Step 12</b> |
| 9  | <ol style="list-style-type: none"> <li>1. Release the brake pedal.</li> <li>2. Turn the ignition OFF, then wait 15 seconds.</li> <li>3. Pump the brake pedal two times to check for vacuum booster available vacuum reserve. Observe pedal effort.</li> </ol> <p>If operating properly, the vacuum brake booster should maintain assist for at least two pedal applications.</p> <p>Did the brake pedal effort increase significantly?</p> | Go to <b>Step 12</b> | Go to <b>Step 10</b> |
| 10 | <p>Inspect the brake pedal pushrod and the brake pedal for misalignment, a bent condition and/or damage.</p> <p>Is the brake pedal pushrod and/or the brake pedal misaligned, bent or damaged?</p>                                                                                                                                                                                                                                         | Go to <b>Step 11</b> | Go to <b>Step 13</b> |
| 11 | <p>Replace the brake pedal pushrod and/or the brake pedal, as necessary. Refer to the following procedure(s).</p> <ul style="list-style-type: none"> <li>• <b><u>Brake Pedal Assembly Replacement</u></b></li> <li>• <b><u>Vacuum Brake Booster Replacement</u></b> for a bent or damaged pedal pushrod replacement</li> </ul> <p>Did you complete the replacement?</p>                                                                    | Go to <b>Step 13</b> | -                    |
|    | Replace the vacuum brake booster. Refer to                                                                                                                                                                                                                                                                                                                                                                                                 |                      |                      |

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|    |                                                                                                                          |                                                   |   |
|----|--------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|---|
| 12 | <b>Vacuum Brake Booster Replacement.</b><br>Did you complete the replacement?                                            | Go to <b>Step 13</b>                              | - |
| 13 | Install or connect any components that were removed or disconnected during diagnosis.<br>Did you complete the operation? | Brake Assist System OK<br>Return to Symptom Table | - |

### BRAKE SYSTEM VEHICLE ROAD TEST

#### Preliminary Inspections

1. Visually inspect easily accessible brake system components for obvious damage and/or leaks which may indicate that the vehicle should not be driven until further inspections have been completed.
2. Inspect the brake master cylinder reservoir fluid level and adjust only if necessary for brake system road testing. Refer to **Master Cylinder Reservoir Filling**.
3. Inspect the tire inflation pressures and adjust as necessary.
4. Inspect the tire tread patterns to ensure that they are the same or very similar, especially per axle.
5. Ensure that the vehicle is not loaded unevenly prior to brake system road testing.

#### Road Testing Procedure

**CAUTION: Road test a vehicle under safe conditions and while obeying all traffic laws. Do not attempt any maneuvers that could jeopardize vehicle control. Failure to adhere to these precautions could lead to serious personal injury and vehicle damage.**

1. Start the engine and allow it to idle.
2. Check to see if the brake system warning lamp remains illuminated.
3. If the brake system warning lamp remains illuminated, DO NOT proceed to test drive the vehicle until it is diagnosed and repaired. Refer to **Symptoms - Hydraulic Brakes**.
4. Select a smooth, dry, clean and level road or large lot that is as free of traffic and obstacles as possible for brake system low speed road testing.
5. With the transmission in PARK, lightly apply the brake pedal. Observe both the pedal feel and the pedal travel.
6. If the brake pedal apply felt spongy, or the pedal travel was excessive, DO NOT drive the vehicle until it is repaired.
7. If the brake pedal apply did not feel spongy and the pedal travel was not excessive, proceed to step 8.
8. Release and apply the brakes.



9. While continuing to apply the brakes, shift the transmission into DRIVE, release the brakes and allow the engine to idle the vehicle away from the stopped position. Observe for a slow release of the brake system.
10. With the aid of an assistant to observe the vehicle's performance from outside of the vehicle, drive the vehicle at a low speed and lightly apply the brakes while driving past the assistant. Have the assistant observe for brake system noise from the side of the vehicle closest to them, while you observe both the pedal effort and the pedal travel.
11. If the brake pedal apply effort was excessive, or the pedal travel was excessive, DO NOT continue to test drive the vehicle until it is repaired.
12. If the brake pedal apply effort was not excessive and the pedal travel was not excessive, proceed to step 13.
13. Drive the vehicle in the opposite direction, at the same low speed and lightly apply the brakes while driving past the assistant. Have the assistant observe for brake system noise from the side of the vehicle closest to him.
14. Drive the vehicle at a low speed and shift the transmission into NEUTRAL without applying the brakes. Observe for a rapid deceleration in vehicle speed, indicating possible brake drag.
15. Select a smooth, dry, clean and level road that is as free of heavy traffic as possible for brake system moderate speed road testing.
16. Drive the vehicle at a moderate speed. Observe for a pull and/or incorrect tracking of the vehicle without the brakes applied.
17. While continuing to drive the vehicle at a moderate speed, perform several light applies of the brakes. Observe the pedal effort and the pedal travel, observe for brake system noise, pulsation and/or brake drag.
18. If the brake pedal apply effort was excessive, or the pedal travel was excessive, DO NOT continue to test drive the vehicle until it is repaired.
19. If the brake pedal apply effort was not excessive and the pedal travel was not excessive, proceed to step 20.
20. While continuing to drive the vehicle at a moderate speed, perform several moderate applies of the brakes. Observe the pedal effort and the pedal travel, observe for brake system pulsation and/or uneven braking action - either side to side, or front to rear.

A small amount of vehicle front end dip is expected during a moderate apply of the brakes.

21. If the brake pedal apply effort was excessive, or the pedal travel was excessive, DO NOT continue to test drive the vehicle until it is repaired.

## **BRAKE PEDAL TRAVEL MEASUREMENT AND INSPECTION**

### **Tools Required**

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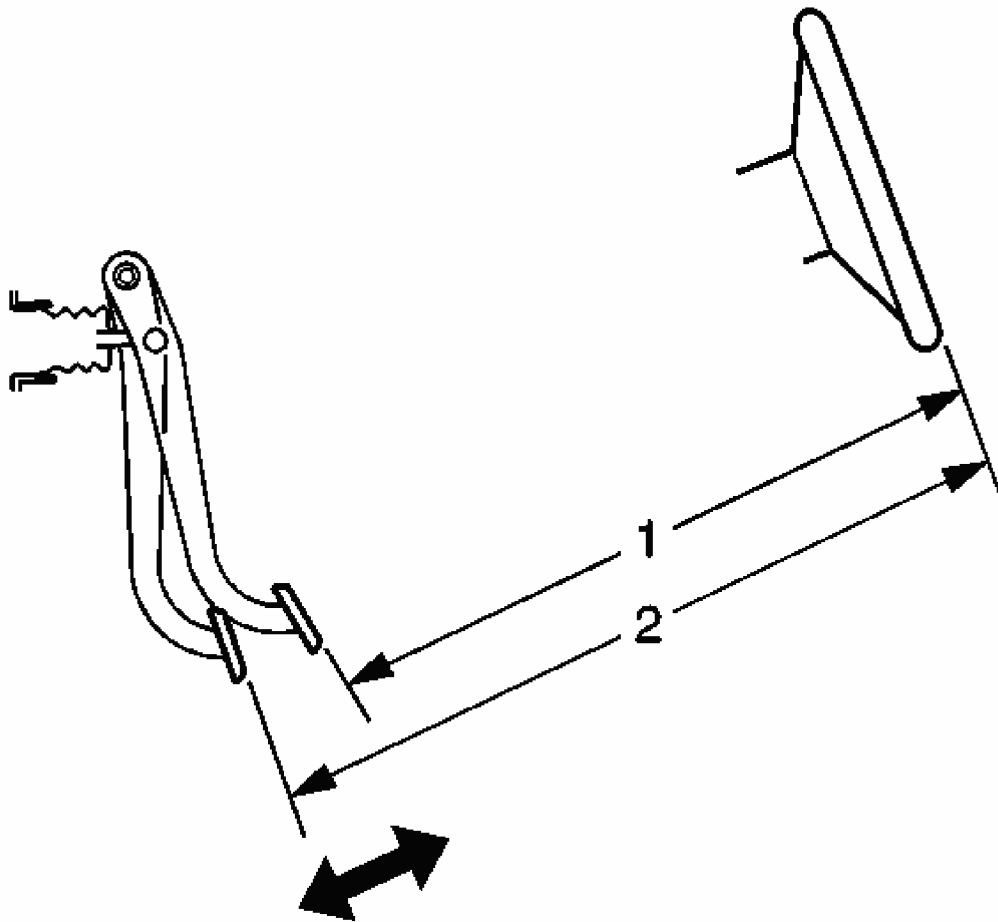
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**J 28662** Brake Pedal Effort Gauge. See Special Tools and Equipment.**Measurement and Inspection**

1. With the ignition OFF and the brakes cool, apply the brakes 3-5 times, or until the brake pedal becomes firm, in order to deplete the brake booster power reserve.
2. Install the **J 28662** to the brake pedal.



**Fig. 3: Measuring Brake Pedal Travel**  
Courtesy of GENERAL MOTORS CORP.

3. Measure and record the distance (1) from the brake pedal to the rim of the steering wheel; note the points of measurement.
4. Apply and maintain the brakes with 445 N (100 lb) of force to the brake pedal, as indicated on the **J 28662**.

5. While maintaining 445 N (100 lb) of force to the brake pedal, measure and record the distance (2) from the same point on the brake pedal to the same point on the rim of the steering wheel.
6. Release the brakes and repeat steps 4 and 5 to obtain a second measurement. After obtaining a second measurement, proceed to step 7.
7. Average the first and second measurements recorded during the two applies of the brakes.
8. Subtract the initial measurement, unapplied (1), from the averaged, applied measurement (2) to obtain the brake pedal travel distance.

**Specification:** Maximum brake pedal travel (measured with the ignition OFF, brake booster power assist depleted, and the brakes cool): 64 mm (2.5 in).

#### **BRAKE SYSTEM VACUUM SOURCE TEST**

1. Disconnect the engine vacuum hose from the vacuum brake booster check valve.
2. Install a vacuum gage to the engine vacuum hose.
3. Start the engine and allow the engine to idle until normal operating temperatures are reached.
4. Check to see if the engine vacuum reading is within the specified normal engine vacuum range.

**Specification:** 47-68 kPa (14-20 in Hg)

5. Turn the ignition OFF.
6. If the engine vacuum reading is within the specified normal range, proceed to step 10.
7. If the engine vacuum reading is NOT within the specified normal range, inspect the engine vacuum hose for the following conditions.
  - Tight connection to the engine
  - Collapse, deformation or contamination
  - Cracks, cuts, dry-rot
8. If any of these conditions were found with the engine vacuum hose, replace the hose, then repeat steps 2-4.
9. If none of these conditions were found with the engine vacuum hose, then there is an engine vacuum source problem, check the engine vacuum system.
10. Remove the vacuum brake booster check valve from the booster.
11. Install the check valve to the engine vacuum hose.
12. Install the vacuum gage to the check valve.
13. Start the engine and allow the engine to idle until normal operating temperatures are reached.

14. Turn the ignition OFF.
15. Check to see if the engine vacuum reading is maintained within the specified normal engine vacuum range.

**Specification:** 47-68 kPa (14-20 in Hg)

16. If the engine vacuum reading is maintained within the specified normal range, proceed to step 18.
17. If the engine vacuum reading is NOT maintained within the specified normal range, replace the brake booster check valve, then repeat steps 11-15.
18. Inspect the brake booster check valve grommet for the following conditions:
  - Firm connection to the vacuum brake booster
  - Deformation or contamination
  - Cracks, cuts, dry-rot
19. If any of these conditions were found with the check valve grommet, replace the grommet.

#### **BRAKE SYSTEM EXTERNAL LEAK INSPECTION**

**CAUTION:** Refer to Brake Fluid Irritant Caution in Cautions and Notices.

**NOTE:** Refer to Brake Fluid Effects on Paint and Electrical Components Notice in Cautions and Notices.

1. In order to inspect for external brake fluid leaks, first check the fluid level in the master cylinder.

While a slight brake fluid level drop can be considered a normal condition due to brake lining wear, a very low level may indicate a brake fluid leak in the hydraulic system.

2. If the fluid level is abnormally low, adjust the brake fluid level. Refer to Master Cylinder Reservoir Filling.
3. Start the engine and allow it to idle.
4. Apply constant, moderate foot pressure to the brake pedal.

If the brake pedal gradually falls away while under foot pressure, there may be a brake fluid leak.

5. Turn OFF the ignition.
6. Visually inspect the following brake system components for brake fluid leaks, excessive corrosion, and damage. Give particular attention to all brake pipe and flexible

hose connections to ensure that there are not any slight brake fluid leaks - even though the brake pedal may feel firm and hold steady:

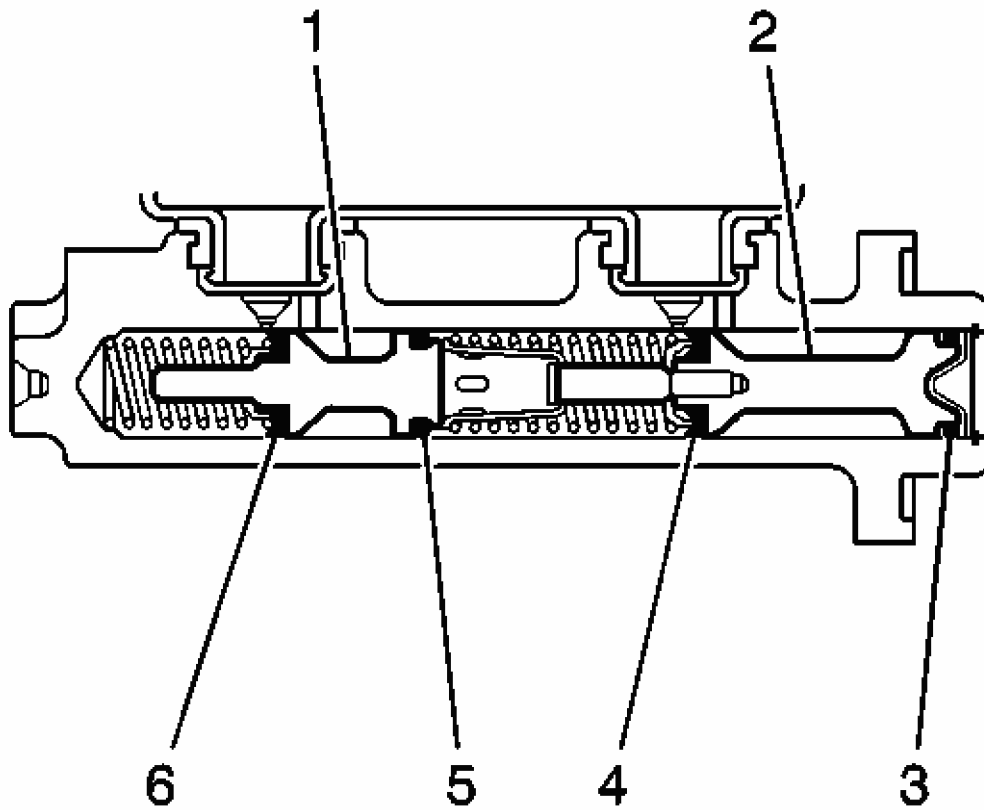
- Master cylinder brake pipe fittings
  - All brake pipe connections
  - Brake pipes
  - Brake hoses and connections
  - Brake calipers and/or wheel cylinders, if equipped
7. While slight dampness around the master cylinder reservoir can be considered acceptable, brake fluid leaking from any of the brake system components requires immediate attention. If any of these components exhibit signs of brake fluid leakage, repair or replace those components. After the repair or replacement, reinspect the hydraulic brake system to assure proper function.

#### **BRAKE SYSTEM INTERNAL LEAK TEST**

**CAUTION:** Refer to Brake Fluid Irritant Caution in Cautions and Notices.

**NOTE:** Refer to Brake Fluid Effects on Paint and Electrical Components Notice in Cautions and Notices.

1. Start the engine and allow it to idle.
2. Apply light, steady pressure to the brake pedal. Observe both the brake pedal feel and travel.
3. Release the brakes and turn OFF the ignition.
4. If the brake pedal apply felt spongy, but the brake pedal travel was not excessive, perform the following steps:
  1. Inspect the brake system for external leaks. Refer to Brake System External Leak Inspection.
  2. Pressure bleed the brake system in order to purge any air that may be trapped in the system. Refer to Hydraulic Brake System Bleeding (Manual) or Hydraulic Brake System Bleeding (Pressure).



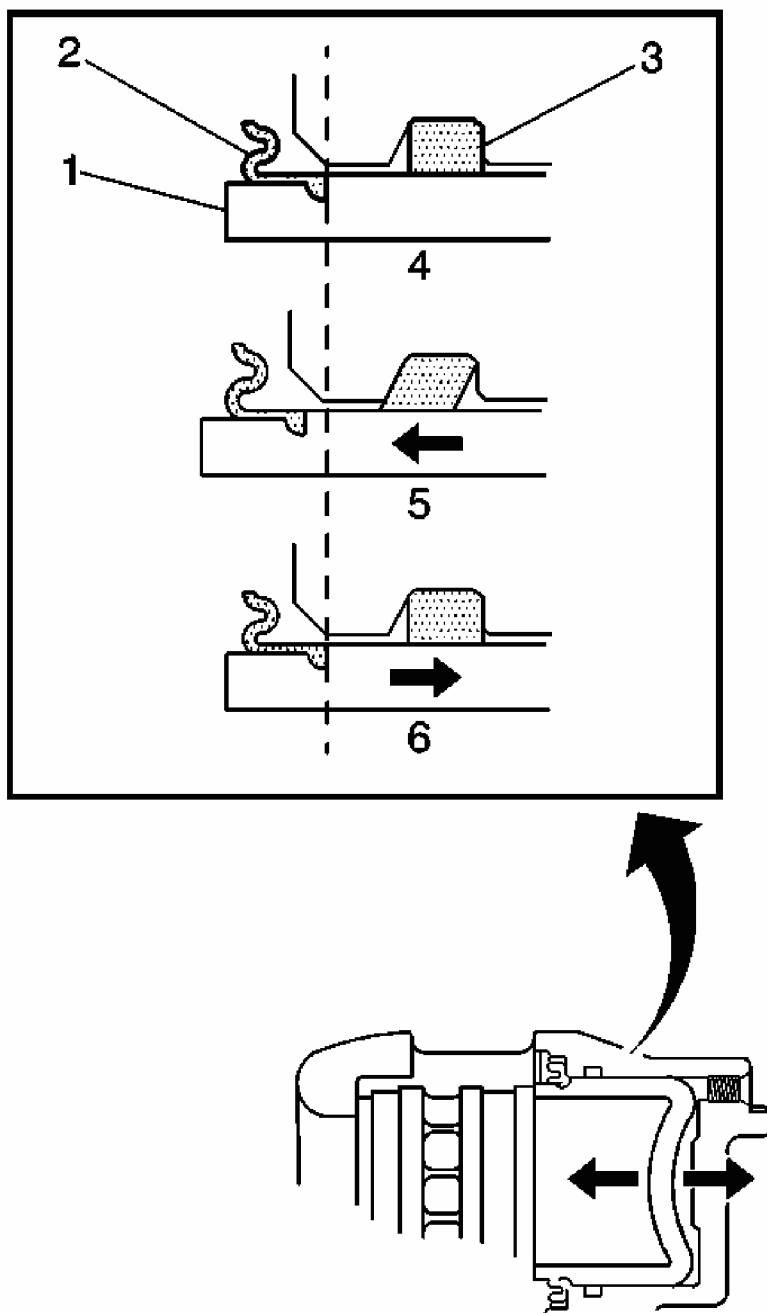
**Fig. 4: Cross Sectional View Of Brake Master Cylinder**  
**Courtesy of GENERAL MOTORS CORP.**

5. If the brake pedal apply did not feel spongy, but the brake pedal travel was excessive, perform the following steps:
  1. Loosen the master cylinder-to-brake power booster mounting nuts.
  2. Carefully pull the master cylinder away from the brake power booster just enough to inspect the mounting surface of the master cylinder.
  3. Inspect the master cylinder mounting surface at the primary piston (2) for brake fluid leaks.
6. If the master cylinder exhibits any leakage around the primary piston (2), then the primary piston primary seal (4) and/or secondary seal (3) is leaking and the master cylinder requires overhaul or replacement.
7. If the master cylinder primary piston (2) does not exhibit any leakage, pressure bleed the brake system. Refer to **Hydraulic Brake System Bleeding (Manual)** or **Hydraulic Brake System Bleeding (Pressure)**.

8. If the brake pedal apply did not feel spongy, and the brake pedal travel was initially steady and not excessive, but then gradually fell, then the master cylinder requires overhaul or replacement due to an internal leak past the secondary piston (1) from the secondary piston primary seal (6) or secondary seal (5).
9. If the brake pedal apply did not feel spongy, and the brake pedal travel was initially steady and not excessive, then fell slightly, then became steady again, then the brake pressure modulator valve (BPMV) may be leaking internally, and may require replacement.

**HYDRAULIC BRAKE COMPONENT OPERATION VISUAL INSPECTION****Disc Brake**

**CAUTION: Refer to Brake Fluid Irritant Caution in Cautions and Notices.**



**Fig. 5: Identifying Brake Caliper/Pad Inspection Areas**  
Courtesy of GENERAL MOTORS CORP.

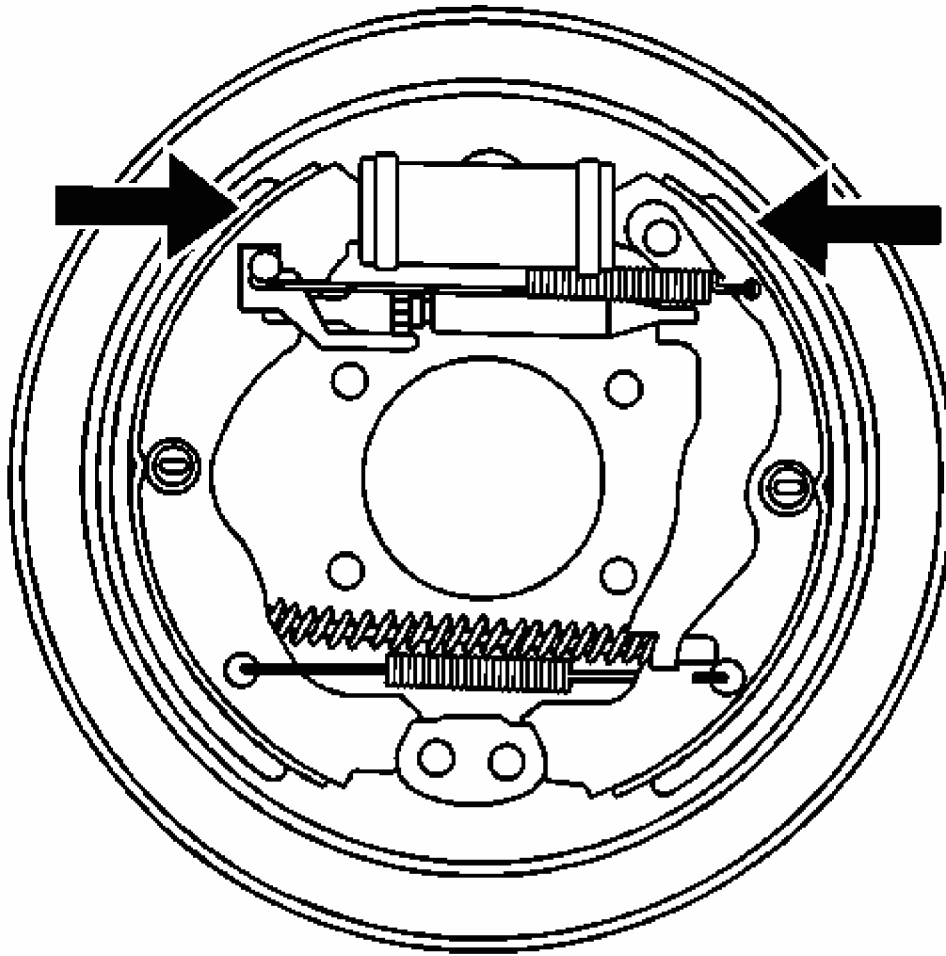
1. With the tire and wheel assemblies removed and the brake rotors retained by wheel lug nuts, visually inspect the caliper piston dust boot (2) sealing area to ensure that there are no brake fluid leaks.
2. If any evidence of a brake fluid leak is present, the brake caliper requires overhaul or



replacement.

3. While the brake system is at rest (4), observe the position of the caliper piston (1) in relation to the caliper housing.
4. Have an assistant apply and release the brake pedal several times while you observe the operation of the hydraulic brake caliper.
  - A. Observe the caliper piston (1) for unrestricted and even movement during each apply of the brake system (5).
  - B. Observe the caliper piston (1) for an unrestricted and even return motion during each release of the brake system (6).
5. If the caliper piston (1) did not exhibit unrestricted and even movement during brake system apply and/or release, the piston square seal (3) may be worn or damaged and the caliper may require overhaul or replacement.

**Drum Brake**



**Fig. 6: Identifying Areas To Press To Compress Wheel Cylinder Pistons**  
Courtesy of GENERAL MOTORS CORP.

1. With the rear tire and wheel assemblies and the brake drums removed, visually inspect the wheel cylinder pistons boot sealing areas to ensure that there are no brake fluid leaks.
2. If any evidence of a brake fluid leak is present, the brake wheel cylinder requires replacement.
3. Using firm hand pressure, simultaneously and evenly apply force on both brake shoes in order to compress the wheel cylinder pistons into their bore.
4. Evenly release the force from both brake shoes to allow the wheel cylinder pistons to return.
5. If one or both of the wheel cylinder pistons did not exhibit unrestricted and even

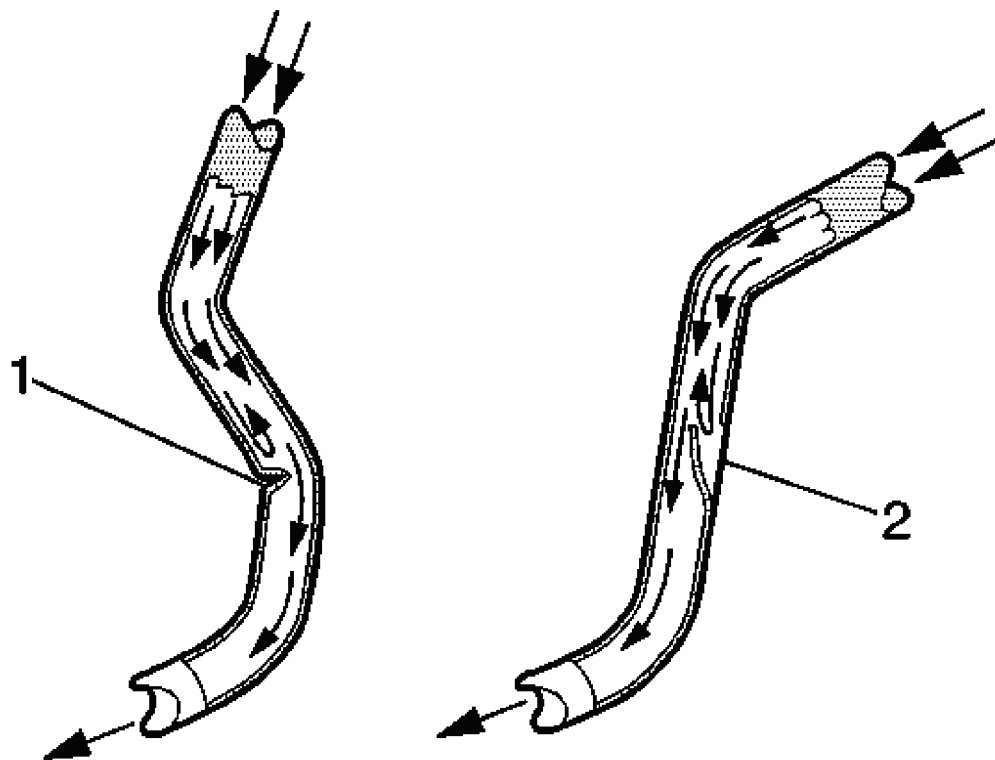
movement during apply and/or release of force, the wheel cylinder may require replacement.

**BRAKE PIPE AND HOSE INSPECTION**

**CAUTION:** Refer to Brake Fluid Irritant Caution in Cautions and Notices.

**NOTE:** Refer to Brake Fluid Effects on Paint and Electrical Components Notice in Cautions and Notices.

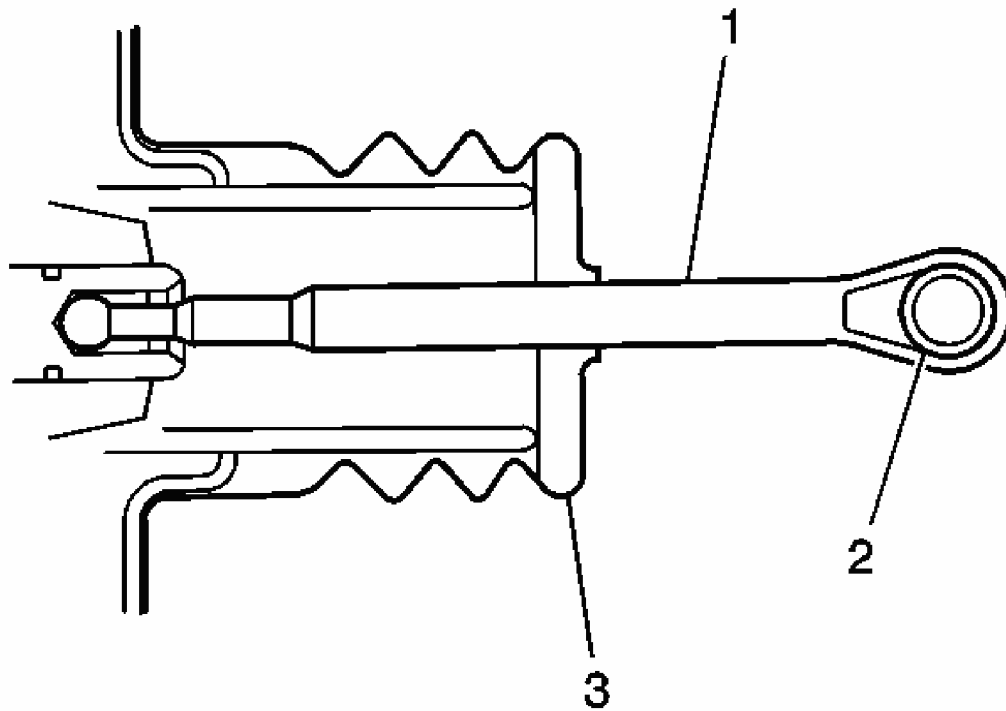
1. Visually inspect all of the brake pipes for the following conditions:
  - Kinks, improper routing, missing or damaged retainers
  - Leaking fittings, excessive corrosion
2. If any of the brake pipes exhibited any of the conditions listed, then the identified pipe, or pipes, require replacement.
3. Ensure that the vehicle axles are properly supported at ride height in order to maintain the proper relationship of the flexible brake hoses to the chassis.



**Fig. 7: Identifying Flexible Brake Hose Failure Conditions**  
 Courtesy of GENERAL MOTORS CORP.

4. Visually inspect all of the flexible brake hoses for the following conditions:
  - Kinks (1), improper routing, twists, chafing, missing or damaged retainers
  - Leaking connections, cracking, dry-rot, blisters, bulges
5. If any of the flexible brake hoses exhibited any of the conditions listed, then the identified flexible brake hose, or hoses require replacement.
6. Squeeze the flexible brake hoses with firm finger pressure to check for soft spots (2), indicating an internal restriction. Check the entire length of each flexible brake hose.
7. If any of the flexible brake hoses were found to have soft spots (2), then the identified flexible brake hose, or hoses require replacement.

#### **BRAKE PEDAL PUSHROD INSPECTION**



**Fig. 8: View of Brake Pedal Pushrod**  
**Courtesy of GENERAL MOTORS CORP.**

1. Disconnect the brake pedal pushrod (1) from the brake pedal.
2. Inspect the brake pedal pushrod eyelet bushing (2), if equipped, for cracks and/or excessive wear.
3. Reposition the pedal pushrod boot (3) toward the front of the vehicle to expose as much of the pedal pushrod (1) as possible.
4. Inspect the brake pedal pushrod (1) for straightness.
5. If the brake pedal pushrod eyelet bushing (2) exhibited cracks and/or excessive wear, then the bushing requires replacement.
6. If the brake pedal pushrod (1) is not straight, then the pushrod requires replacement.
7. Return the pedal pushrod boot (3) to its original position on the pedal pushrod (1).
8. Connect the brake pedal pushrod (1) to the brake pedal.

## REPAIR INSTRUCTIONS

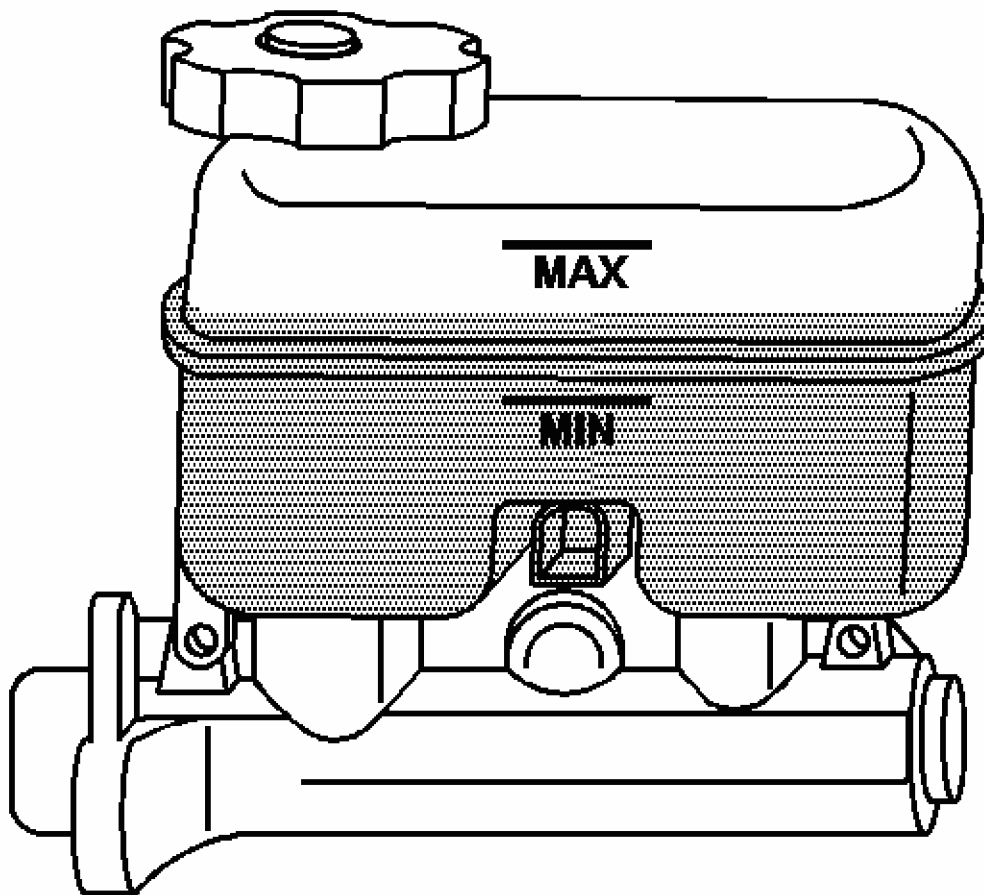
### MASTER CYLINDER RESERVOIR FILLING

**CAUTION: Refer to Brake Fluid Irritant Caution in Cautions and Notices.**

**NOTE: Refer to Brake Fluid Effects on Paint and Electrical Components Notice in Cautions and Notices.**

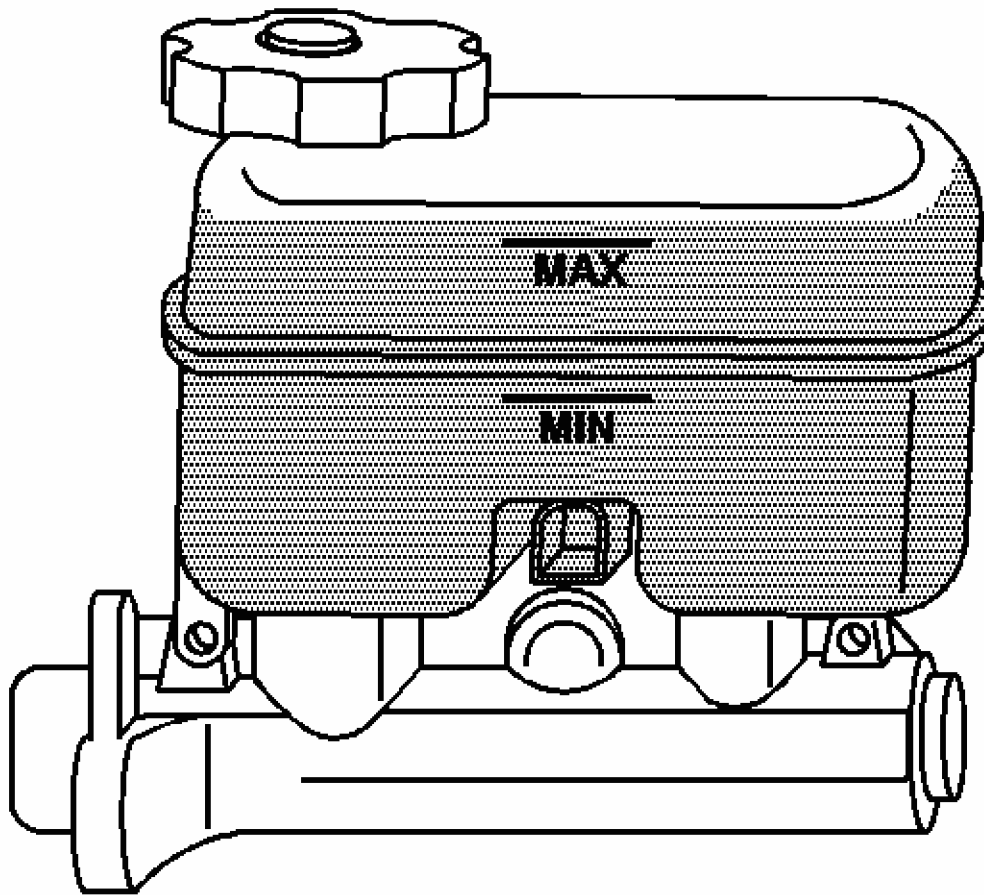
**NOTE: When adding fluid to the brake master cylinder reservoir, use only Delco Supreme 11®, GM P/N 12377967 (Canadian P/N 992667), or equivalent DOT-3 brake fluid from a clean, sealed brake fluid container. The use of any type of fluid other than the recommended type of brake fluid, may cause contamination which could result in damage to the internal rubber seals and/or rubber linings of hydraulic brake system components.**

**NOTE: Refer to Brake Fluid Effects on Paint and Electrical Components Notice in Cautions and Notices.**



**Fig. 9: View Of Half-Full Master Cylinder Reservoir**  
**Courtesy of GENERAL MOTORS CORP.**

1. Visually inspect the brake fluid level through the brake master cylinder reservoir.
2. If the brake fluid level is at or below the half-full point during routine fluid checks, the brake system should be inspected for wear and possible brake fluid leaks.
3. If the brake fluid level is at or below the half-full point during routine fluid checks, and an inspection of the brake system did not reveal wear or brake fluid leaks, the brake fluid may be topped-off up to the maximum-fill level.
4. If brake system service was just completed, the brake fluid may be topped-off up to the maximum-fill level.



**Fig. 10: View Of Full Master Cylinder Reservoir MAX And MIN Marks**  
Courtesy of GENERAL MOTORS CORP.

5. If the brake fluid level is above the half-full point, adding brake fluid is not recommended under normal conditions.
6. If brake fluid is to be added to the master cylinder reservoir, clean the outside of the reservoir on and around the reservoir cap prior to removing the cap and diaphragm. Use only Delco Supreme 11®, GM U.S. P/N 12377967, GM Canada P/N 992667, or equivalent DOT-3 brake fluid from a clean, sealed brake fluid container.

#### **MASTER CYLINDER RESERVOIR REPLACEMENT**

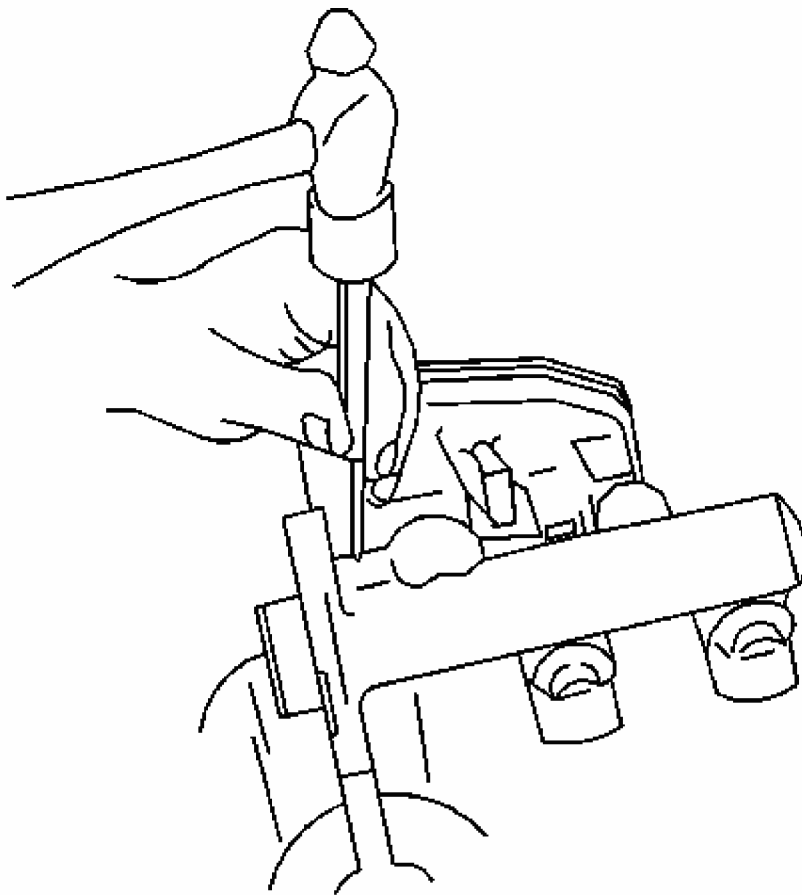
##### **Removal Procedure**

**CAUTION: Refer to Brake Fluid Irritant Caution in Cautions and Notices.**



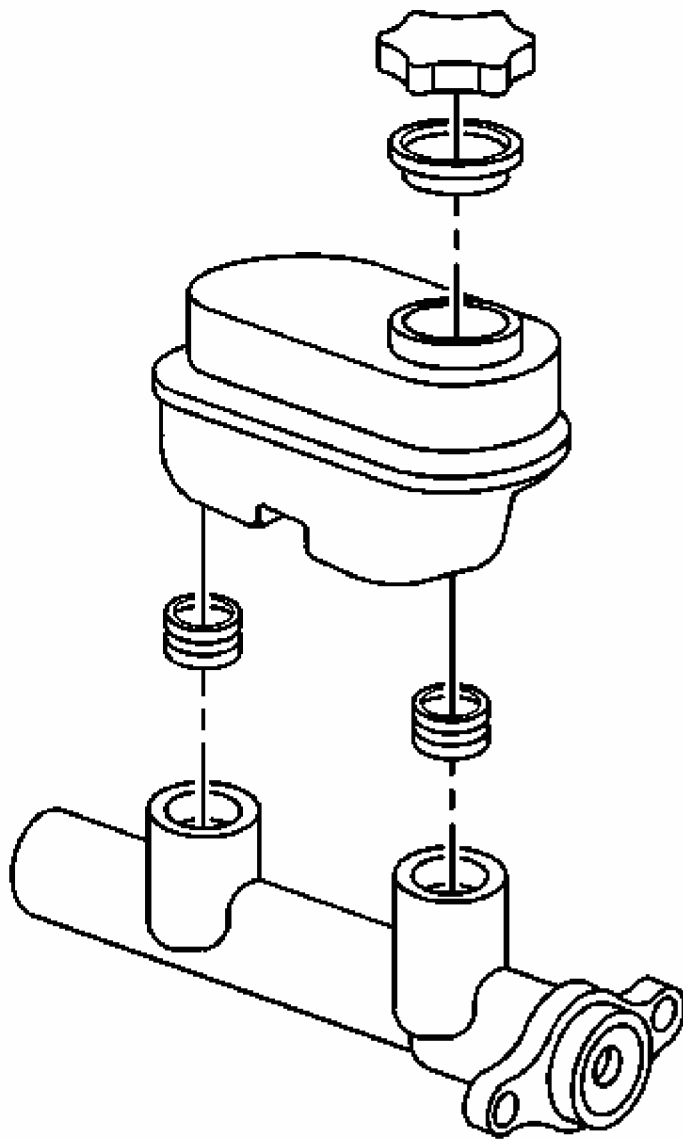
**NOTE:**      **Refer to Brake Fluid Effects on Paint and Electrical Components Notice in Cautions and Notices.**

1. Remove the master cylinder from the vehicle. Refer to **Master Cylinder Reservoir Replacement**.
2. Secure the master cylinder in a vise. Do not clamp the master cylinder body, secure only at the flange.



**Fig. 11: Removing/Installing Reservoir Retaining Pins**  
**Courtesy of GENERAL MOTORS CORP.**

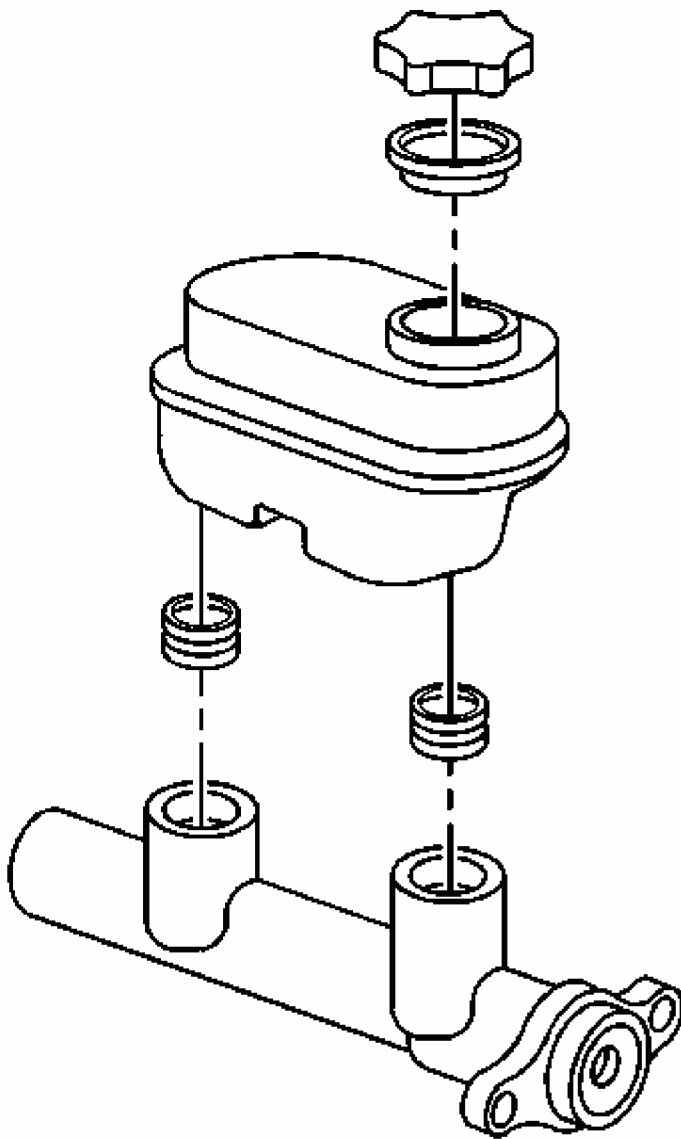
3. Carefully remove the brake master cylinder reservoir retaining pins.



**Fig. 12: View Of Master Cylinder Reservoir**  
**Courtesy of GENERAL MOTORS CORP.**

4. Remove the reservoir from the master cylinder by pulling the reservoir straight up and away from the cylinder.
5. Remove the seals from the master cylinder.

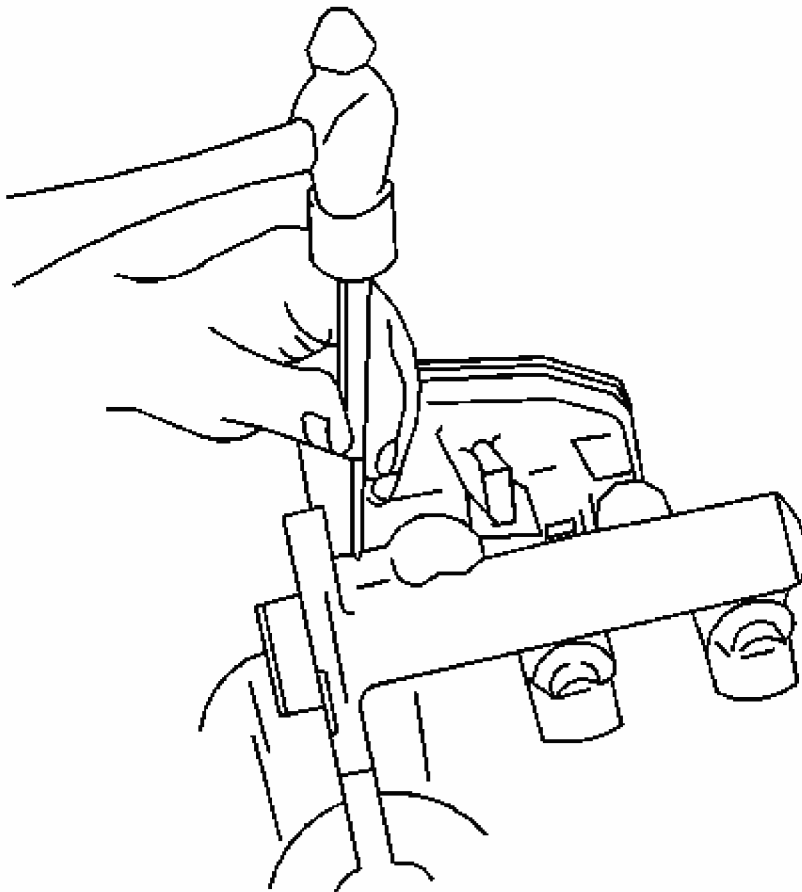
**Installation Procedure**



**Fig. 13: View Of Master Cylinder Reservoir**  
**Courtesy of GENERAL MOTORS CORP.**

1. Inspect the reservoir for cracks or deformation. If found, replace the reservoir.
2. Clean the reservoir with denatured alcohol, or equivalent.
3. Dry the reservoir with non-lubricated, filtered air.
4. Lubricate the new seals and the outer surface area of the reservoir-to-housing barrels with Delco Supreme 11® (GM P/N 12377967) or equivalent DOT-3 brake fluid from a clean, sealed brake fluid container.

5. Install the lubricated seals, make sure they are fully seated.
6. Install the reservoir to the master cylinder by pressing the reservoir straight down on the master cylinder until the pin holes are aligned.



**Fig. 14: Removing/Installing Reservoir Retaining Pins**  
Courtesy of GENERAL MOTORS CORP.

7. Carefully tap the reservoir retaining pins into place to secure the reservoir.
8. Install the cover on the reservoir.
9. Remove the master cylinder from the vice.
10. Install the master cylinder. Refer to **Master Cylinder Reservoir Replacement**.

#### **MASTER CYLINDER REPLACEMENT**

##### **Removal Procedure**

Mitchell Repair

Saturday, December 13, 2008 21:10: VIRUS  
ALERT!

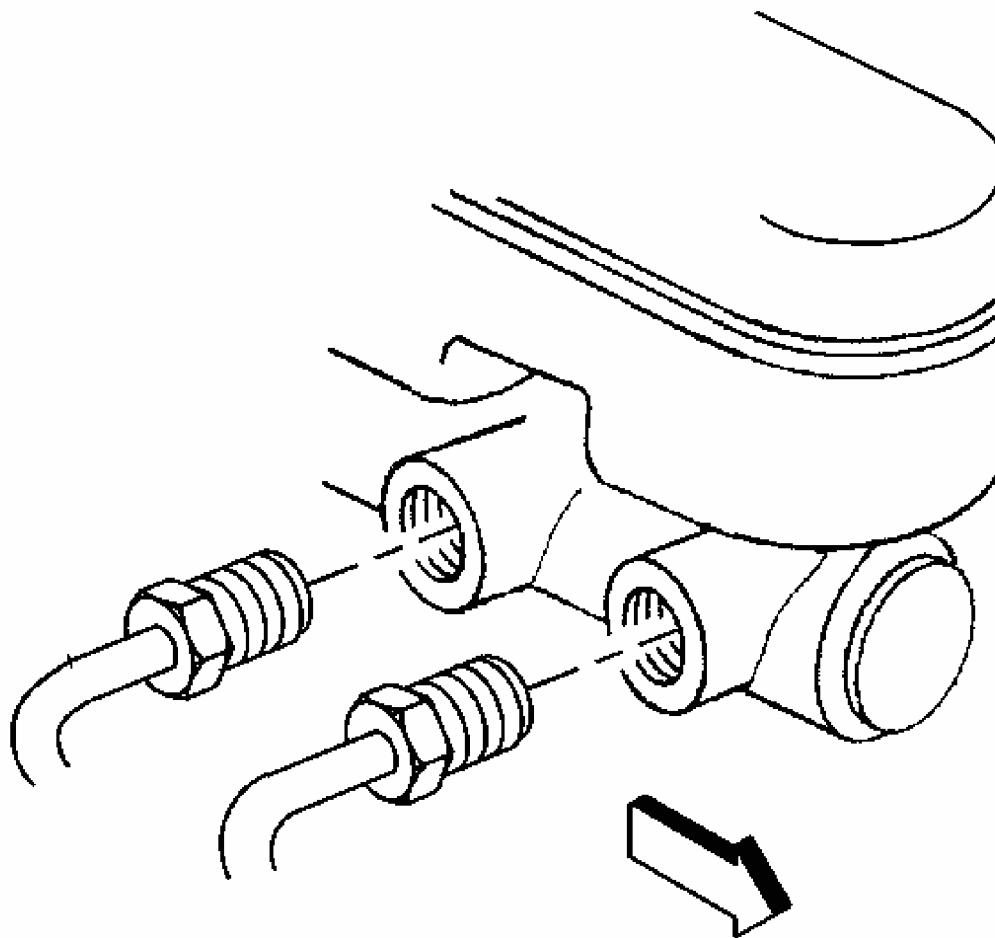
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**CAUTION:** Refer to Brake Fluid Irritant Caution in Cautions and Notices.

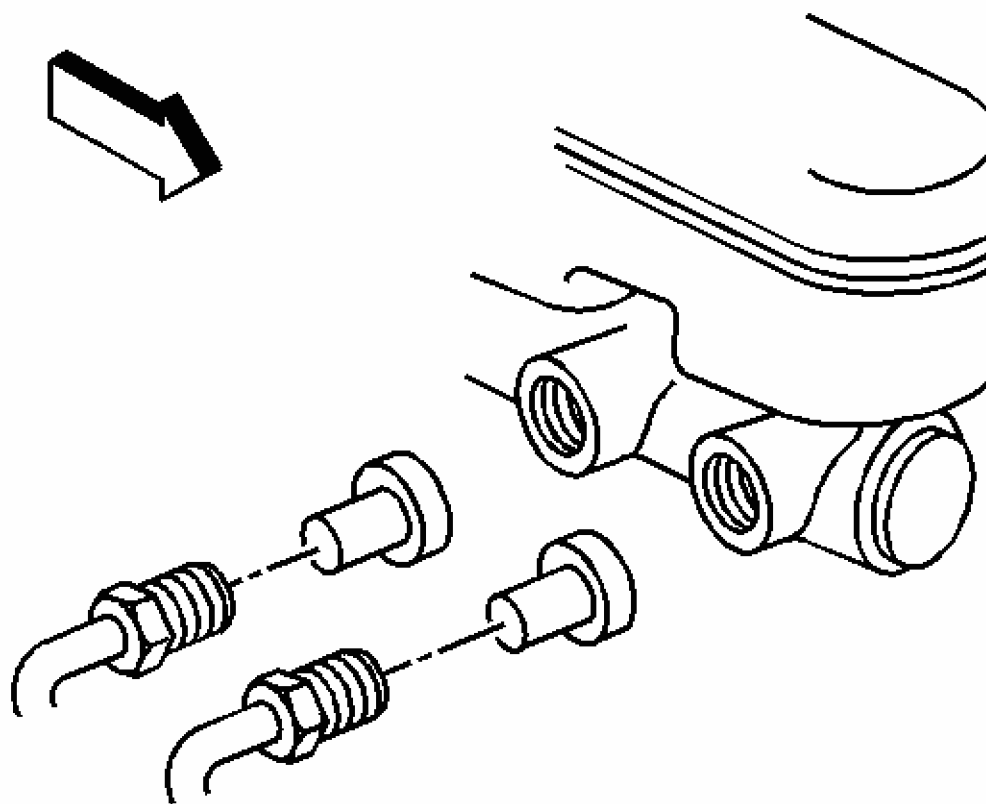
**NOTE:** Refer to Brake Fluid Effects on Paint and Electrical Components Notice in Cautions and Notices.

1. Apply the parking brake and block the wheels.



**Fig. 15: View Of Brake Pipes At Master Cylinder**  
Courtesy of GENERAL MOTORS CORP.

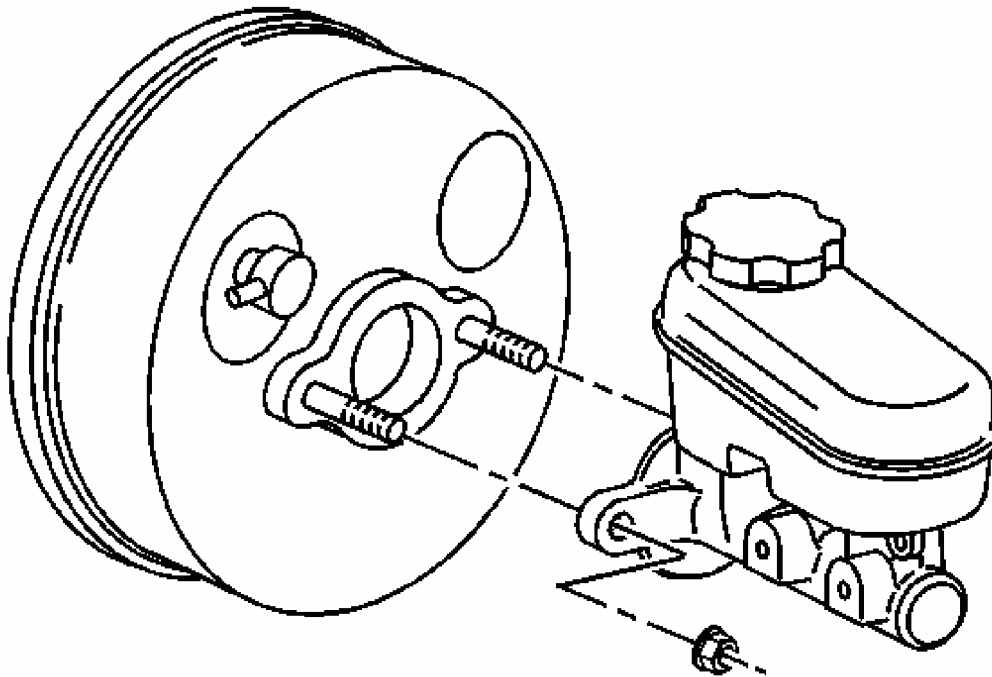
2. Disconnect the brake pipes from the master cylinder.



**Fig. 16: View Of Rubber Plugs For Brake Pipe Ends**  
Courtesy of GENERAL MOTORS CORP.

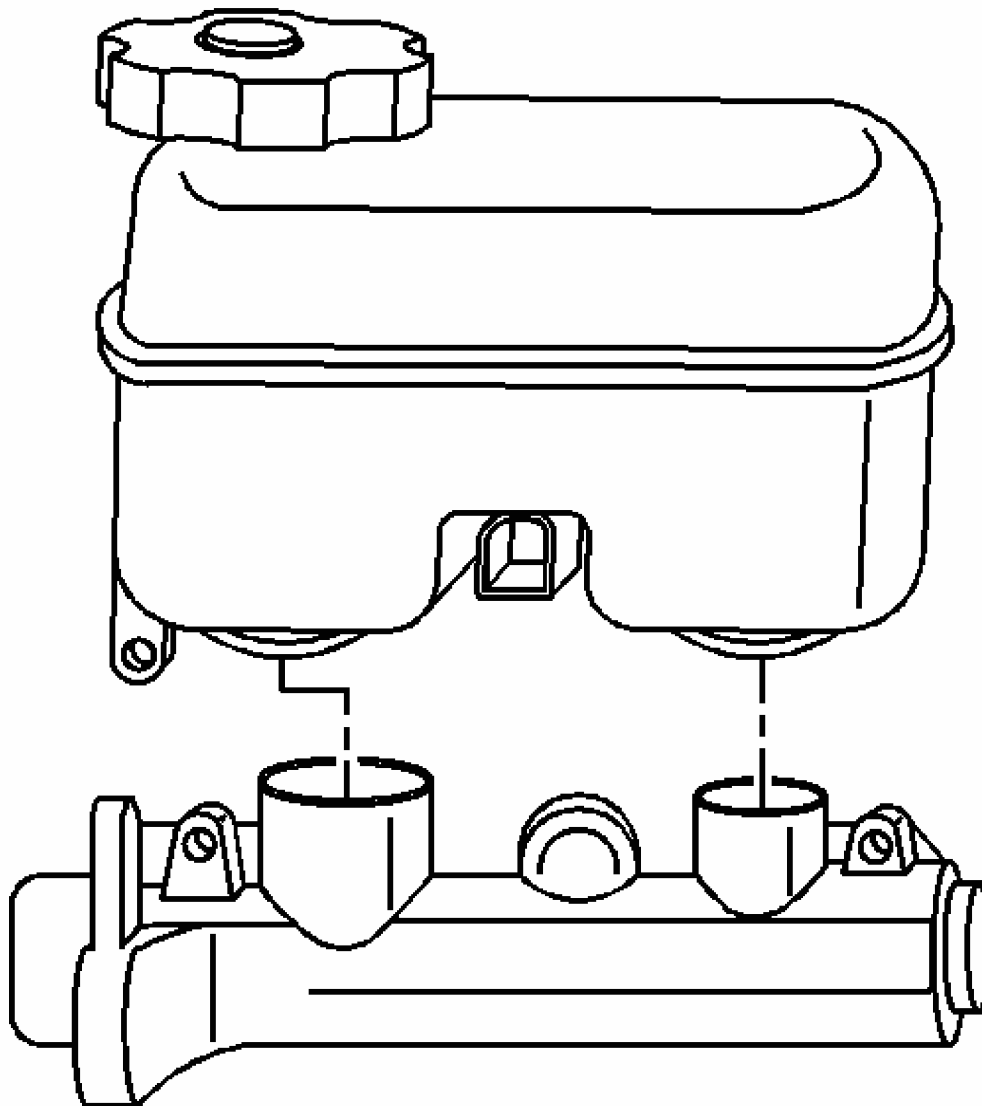
**IMPORTANT:** Install a rubber cap or plug to the exposed brake pipe fitting ends in order to prevent brake fluid loss and contamination.

3. Install the rubber plugs the brake pipe ends.



**Fig. 17: View Of Master Cylinder**  
**Courtesy of GENERAL MOTORS CORP.**

4. Remove the master cylinder nuts and bolts.
5. Remove the master cylinder from the vehicle.
6. Drain the master cylinder reservoir of all the brake fluid.

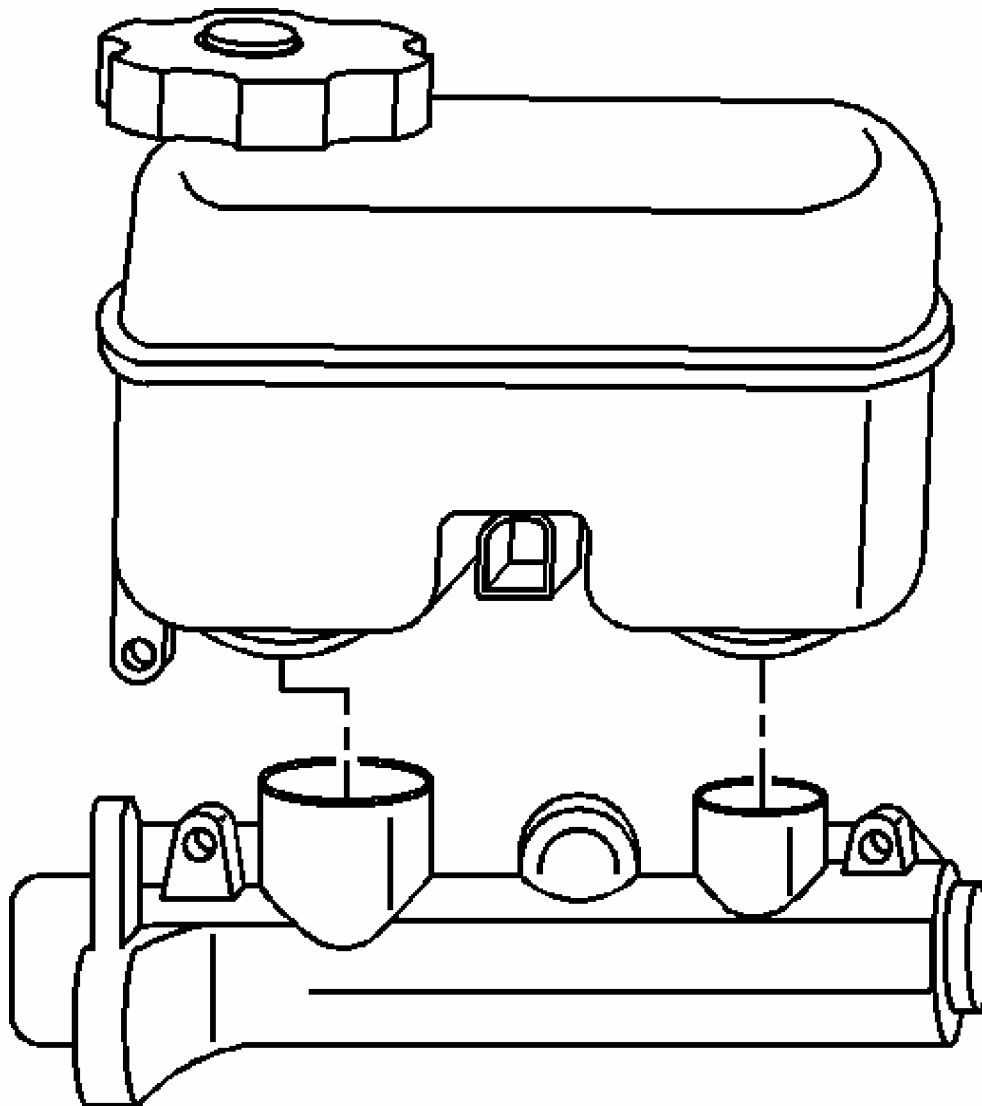


**Fig. 18: View Of Master Cylinder Reservoir**  
**Courtesy of GENERAL MOTORS CORP.**

7. Remove the reservoir from the master cylinder, if needed.

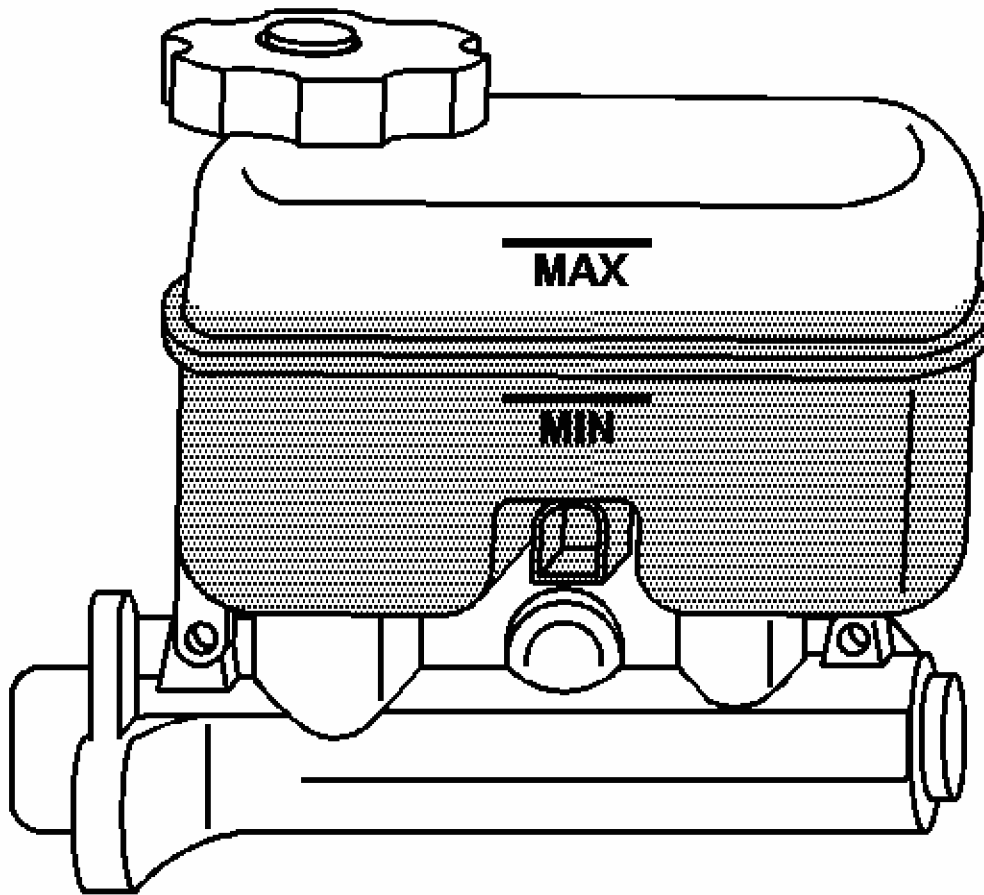
**Installation Procedure**





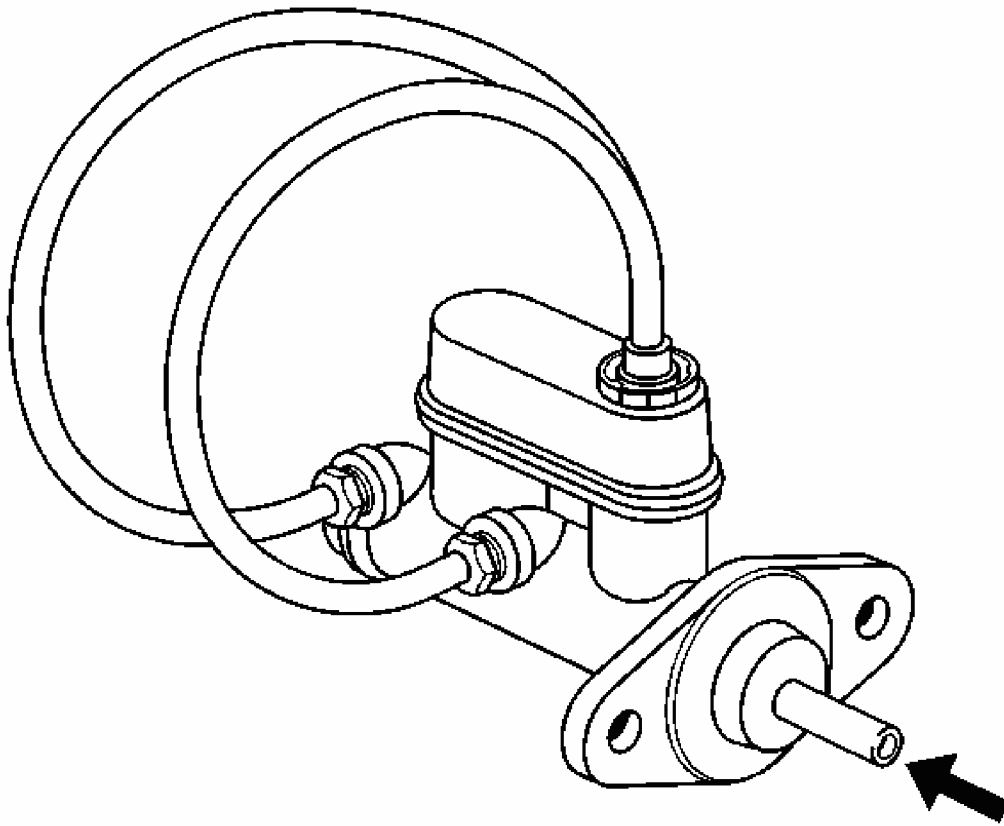
**Fig. 19: View Of Master Cylinder Reservoir**  
**Courtesy of GENERAL MOTORS CORP.**

1. Install the reservoir on the master cylinder, if needed.



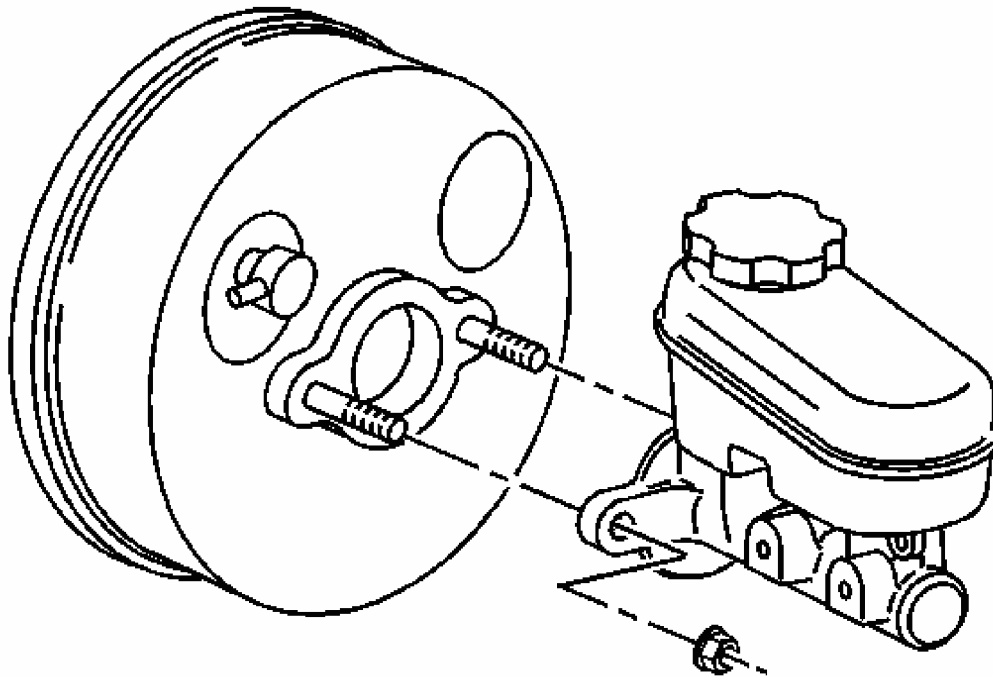
**Fig. 20: View Of Half-Full Master Cylinder Reservoir**  
**Courtesy of GENERAL MOTORS CORP.**

2. Fill the master cylinder reservoir with brake fluid.



**Fig. 21: Bleeding Master Cylinder**  
**Courtesy of GENERAL MOTORS CORP.**

3. Bench bleed the master cylinder. Refer to **Master Cylinder Bench Bleeding**.



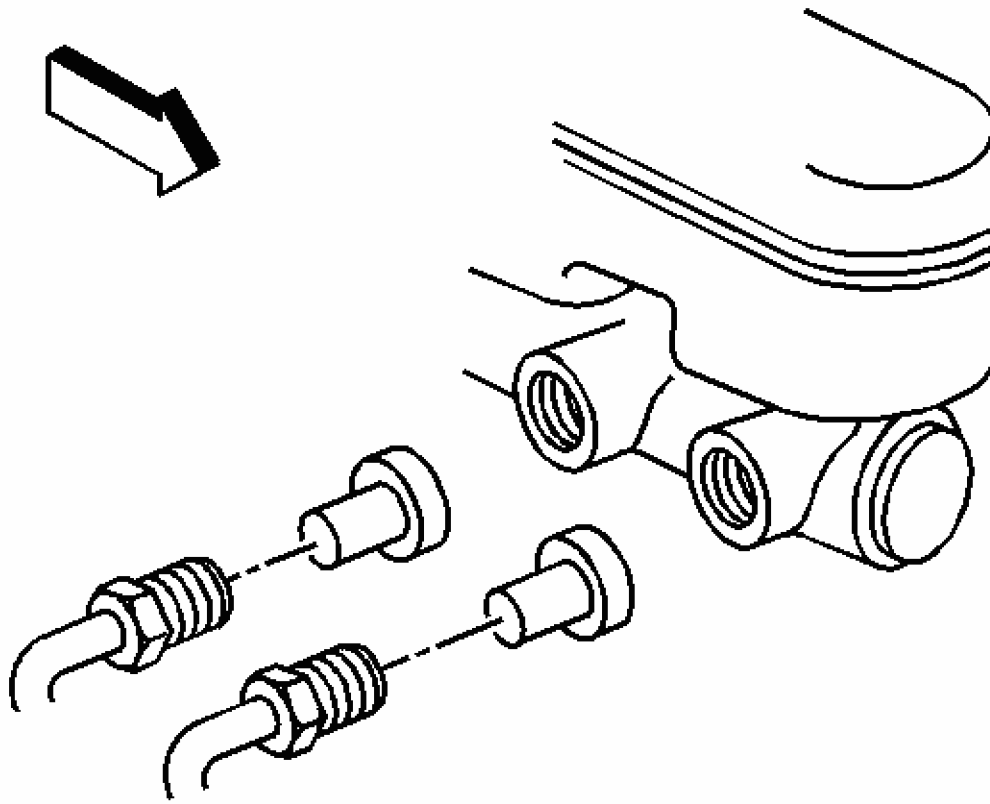
**Fig. 22: View Of Master Cylinder**  
**Courtesy of GENERAL MOTORS CORP.**

4. Install the master cylinder to the vehicle.

**NOTE:** Refer to Fastener Notice in Cautions and Notices.

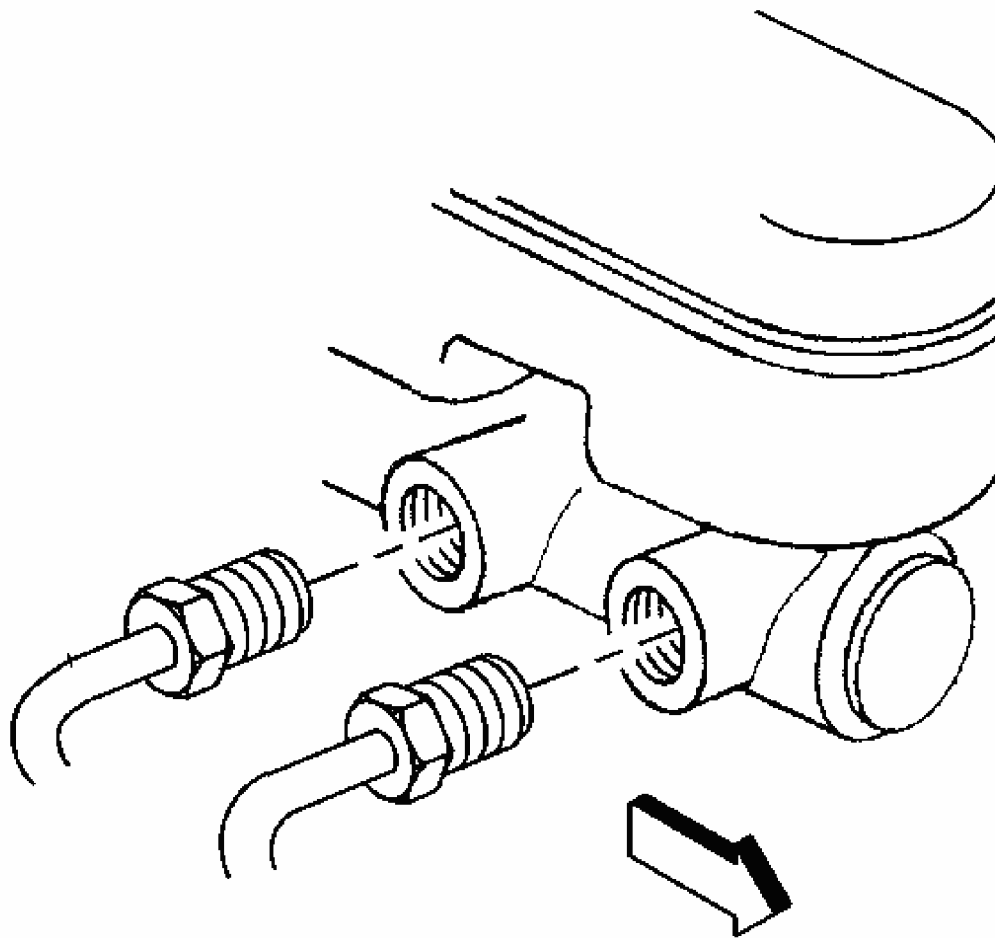
5. Install the master cylinder bolts and nuts.

**Tighten:** Tighten the nuts to 36 N.m (27 lb ft).



**Fig. 23: View Of Rubber Plugs For Brake Pipe Ends**  
**Courtesy of GENERAL MOTORS CORP.**

6. Remove the rubber plugs from the brake lines



**Fig. 24: View Of Brake Pipes At Master Cylinder**  
Courtesy of GENERAL MOTORS CORP.

7. Connect the brake pipes to the master cylinder.

**Tighten:** Tighten the pipe nuts to 30 N.m (22 lb ft).

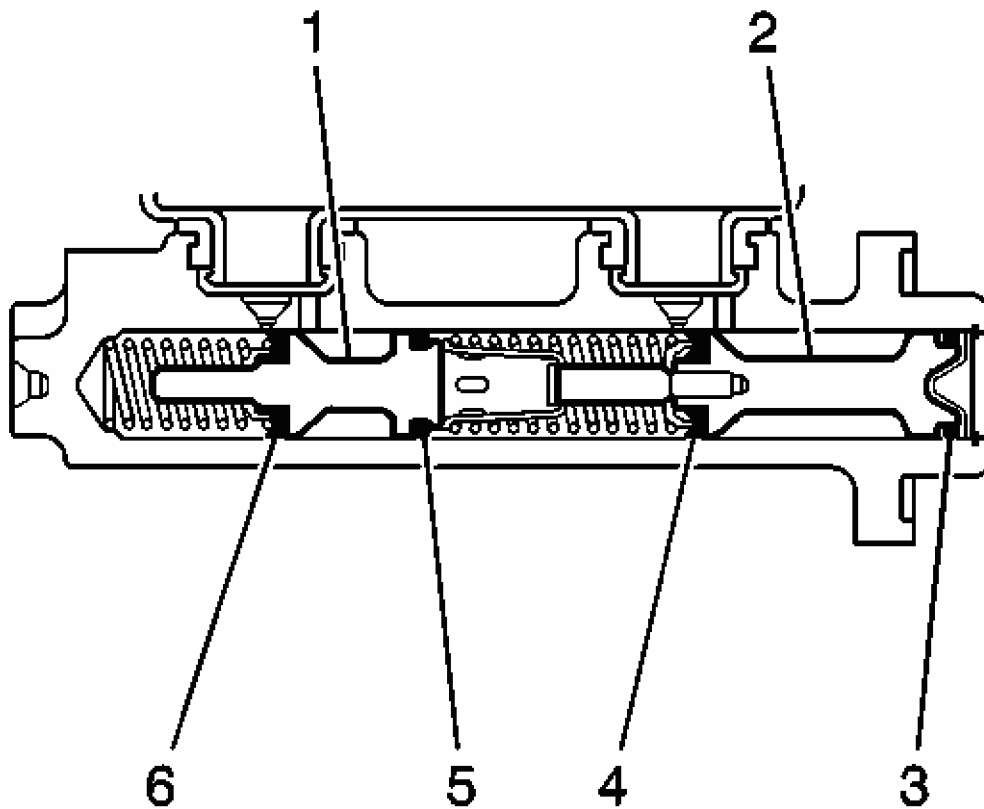
8. Bleed the hydraulic brake system. Refer to **Hydraulic Brake System Bleeding (Manual)** or **Hydraulic Brake System Bleeding (Pressure)**.

## MASTER CYLINDER OVERHAUL

### Disassembly Procedure

1. Remove the brake master cylinder from the vehicle. Refer to **Master Cylinder Replacement**.

2. Secure the mounting flange of the brake master cylinder in a bench vise so that the rear of the primary piston is accessible.
3. Clean the outside of the master cylinder reservoir on and around the reservoir cap prior to removing the cap and diaphragm.
4. Remove the reservoir cap and diaphragm from the reservoir.
5. Inspect the reservoir cap and diaphragm for the following conditions. If any of these conditions are present, replace the affected components.
  - Cuts or cracks
  - Nicks or deformation
6. Remove the master cylinder reservoir from the master cylinder. Refer to **Master Cylinder Reservoir Replacement**.



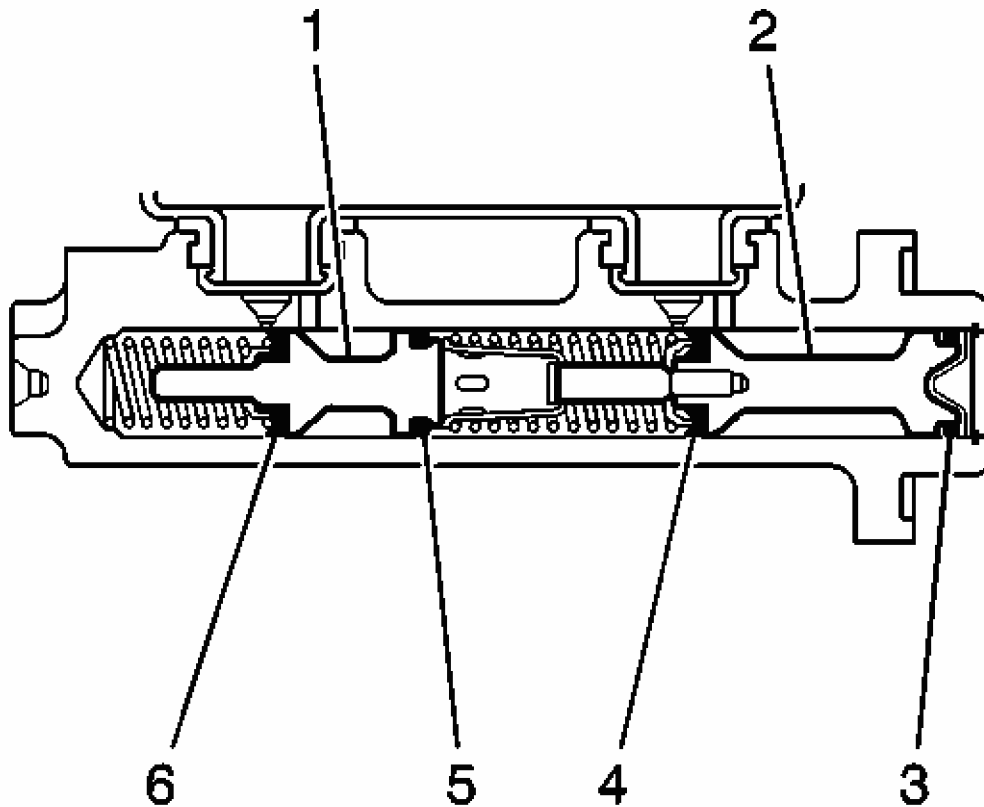
**Fig. 25: Cross Sectional View Of Brake Master Cylinder**  
Courtesy of GENERAL MOTORS CORP.

7. Using a smooth, round-ended tool, depress the primary piston (2) and remove the

piston retainer.

8. Remove the primary piston assembly from the cylinder bore.
9. Plug the cylinder inlet ports and the rear outlet port. Apply low pressure, non-lubricated, filtered air into the front outlet port, in order to remove the secondary piston (1) with the primary (6) and secondary (5) seals, and the return spring.
10. Discard the primary piston assembly, the piston retainer, and the seals and seal retainer from the secondary piston.

#### Assembly Procedure



**Fig. 26: Cross Sectional View Of Brake Master Cylinder**  
Courtesy of GENERAL MOTORS CORP.

**IMPORTANT: Do not use abrasives to clean the brake master cylinder bore.**

1. Clean the interior and exterior of the master cylinder, the secondary piston (1), and the



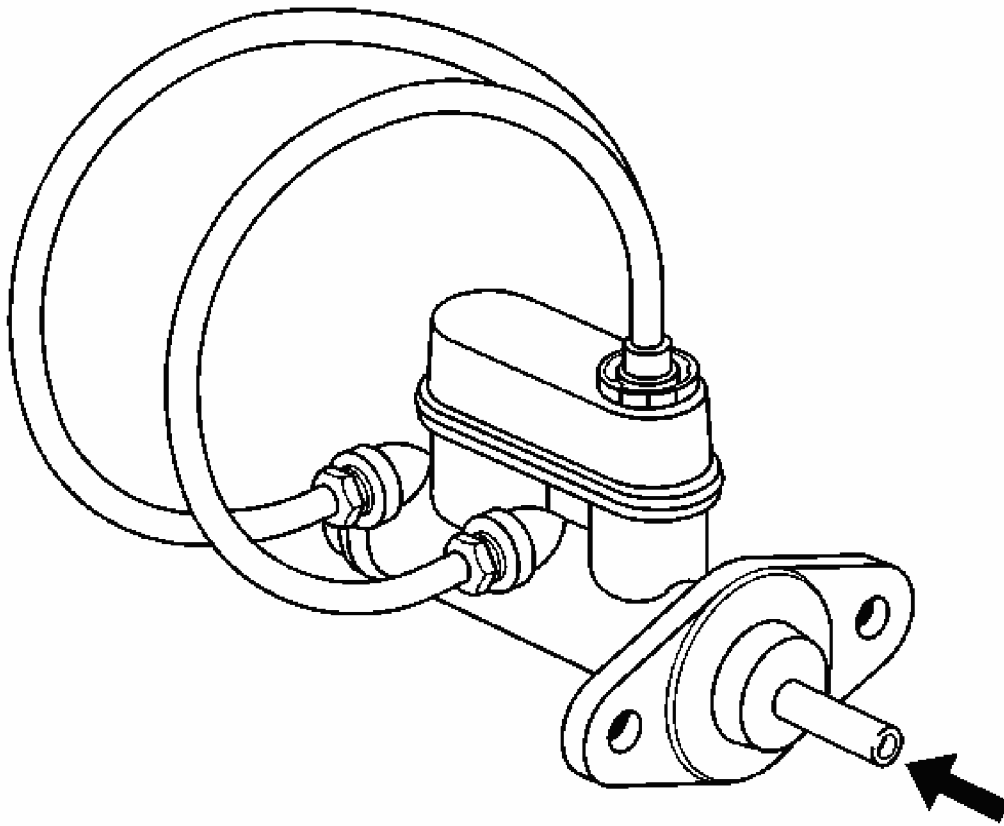
return spring in denatured alcohol, or equivalent.

2. Inspect the master cylinder bore, inlet and outlet ports, the secondary piston (1), and the return spring for cracks, scoring, pitting, and/or corrosion. Replace the master cylinder if any of these conditions exist.
3. Dry the master cylinder and the individual components with non-lubricated, filtered air.
4. Lubricate the master cylinder bore, the secondary piston (1), the return spring, and all of the individual overhaul components with Delco Supreme 11®, GM U.S. P/N 12377967, GM Canada P/N 992667, or equivalent DOT-3 brake fluid from a clean, sealed brake fluid container.
5. Assemble the lubricated, new primary seal (6) and retainer, and new secondary seal (5) onto the secondary piston.
6. Install the lubricated return spring and secondary piston assembly (1) into the cylinder bore.
7. Install the lubricated, new primary piston assembly (2) into the cylinder bore.
8. Using a smooth, round-ended tool, depress the primary piston (2) and install the new piston retainer.
9. Install the master cylinder reservoir to the master cylinder. Refer to **Master Cylinder Reservoir Replacement**.
10. Install the reservoir cap and diaphragm to the reservoir.
11. Install the master cylinder to the vehicle. Refer to **Master Cylinder Replacement**.

#### **MASTER CYLINDER BENCH BLEEDING**

**CAUTION:** Refer to **Brake Fluid Irritant Caution** in Cautions and Notices.

**NOTE:** When adding fluid to the brake master cylinder reservoir, use only Delco Supreme 11®, GM P/N 12377967 (Canadian P/N 992667), or equivalent DOT-3 brake fluid from a clean, sealed brake fluid container. The use of any type of fluid other than the recommended type of brake fluid, may cause contamination which could result in damage to the internal rubber seals and/or rubber linings of hydraulic brake system components.



**Fig. 27: Bleeding Master Cylinder**  
**Courtesy of GENERAL MOTORS CORP.**

1. Secure the mounting flange of the brake master cylinder in a bench vise so that the rear of the primary piston is accessible.
2. Remove the master cylinder reservoir cap and diaphragm.
3. Install suitable fittings to the master cylinder ports that match the type of flare seat required and also provide for hose attachment.
4. Install transparent hoses to the fittings installed to the master cylinder ports, then route the hoses into the master cylinder reservoir.
5. Fill the master cylinder reservoir to at least the half-way point with Delco Supreme 11®, GM U.S. P/N 12377967, GM Canada P/N 992667, or equivalent DOT-3 brake fluid from a clean, sealed brake fluid container.
6. Ensure that the ends of the transparent hoses running into the master cylinder reservoir are fully submerged in the brake fluid.
7. Using a smooth, round-ended tool, depress and release the primary piston as far as it will travel, a depth of about 25 mm (1 in), several times. Observe the flow of fluid

coming from the ports.

As air is bled from the primary and secondary pistons, the effort required to depress the primary piston will increase and the amount of travel will decrease.

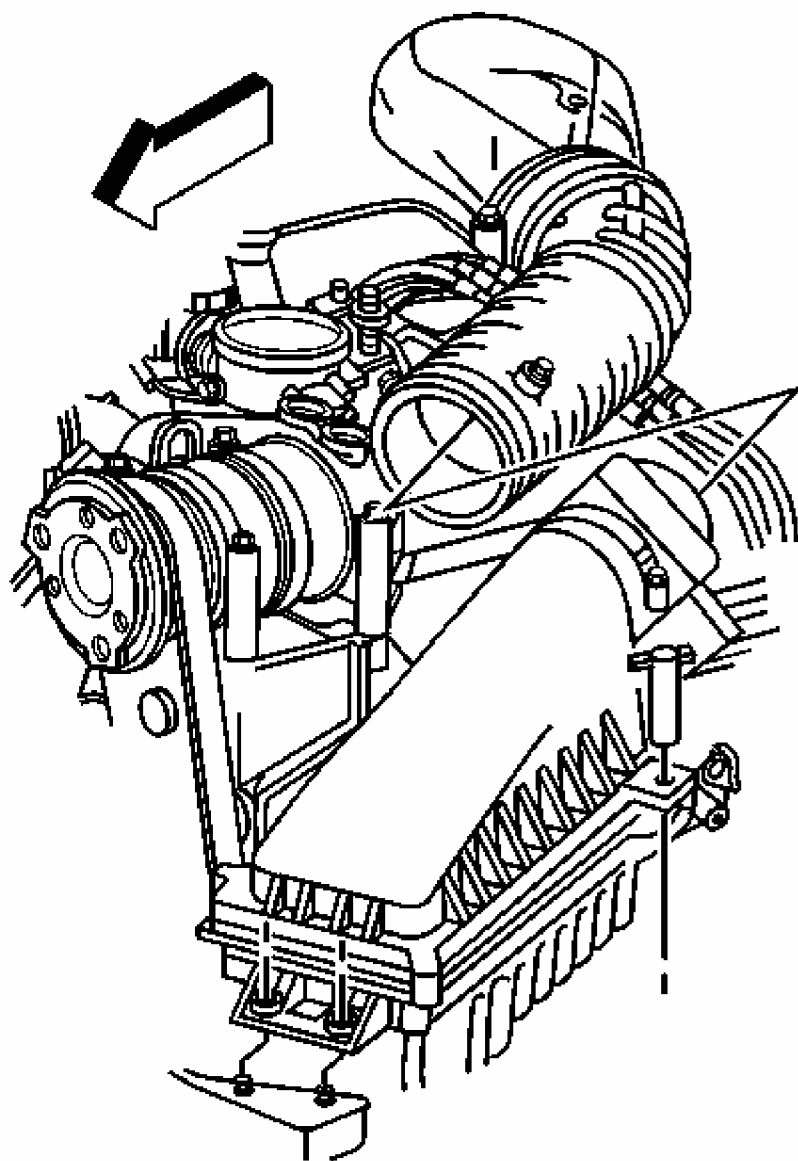
8. Continue to depress and release the primary piston until fluid flows freely from the ports with no evidence of air bubbles.
9. Remove the transparent hoses from the master cylinder reservoir.
10. Install the master cylinder reservoir cap and diaphragm.
11. Remove the fittings with the transparent hoses from the master cylinder ports. Wrap the master cylinder with a clean shop cloth to prevent brake fluid spills.
12. Remove the master cylinder from the vise.

#### **MASTER CYLINDER FLUID LEVEL SENSOR REPLACEMENT**

##### **Removal Procedure**

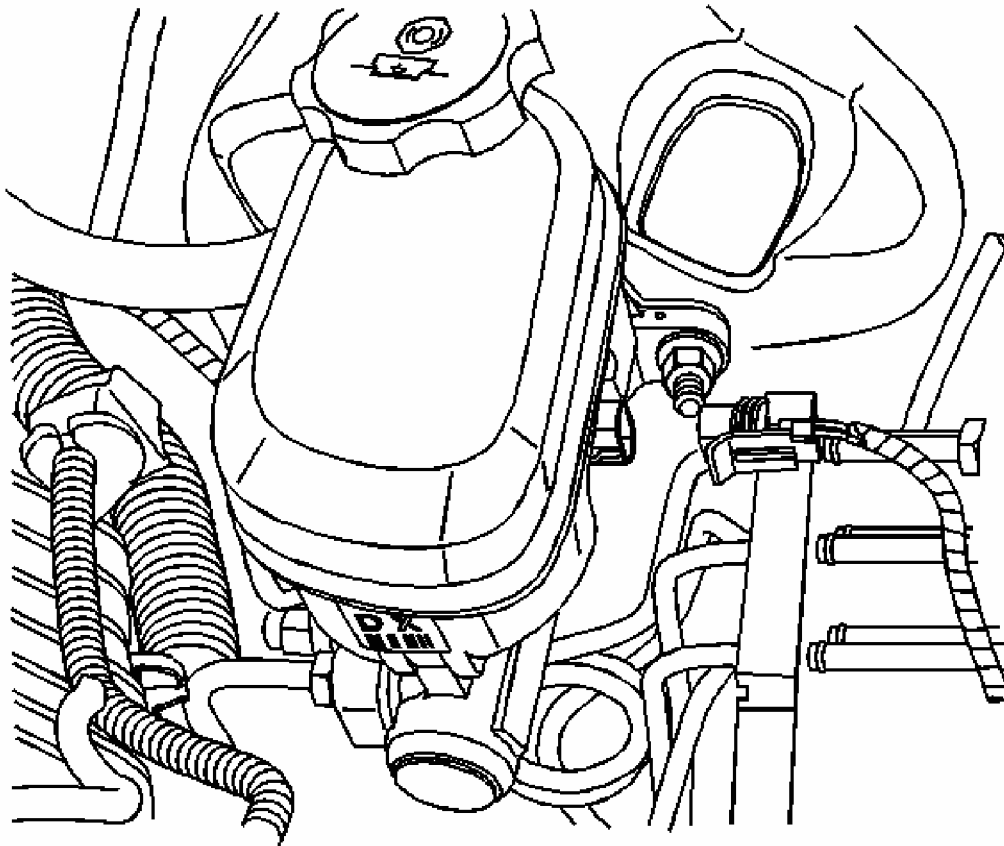
**CAUTION:** Refer to Brake Fluid Irritant Caution in **Cautions and Notices**.

**NOTE:** Refer to Brake Fluid Effects on Paint and Electrical Components Notice in **Cautions and Notices**.



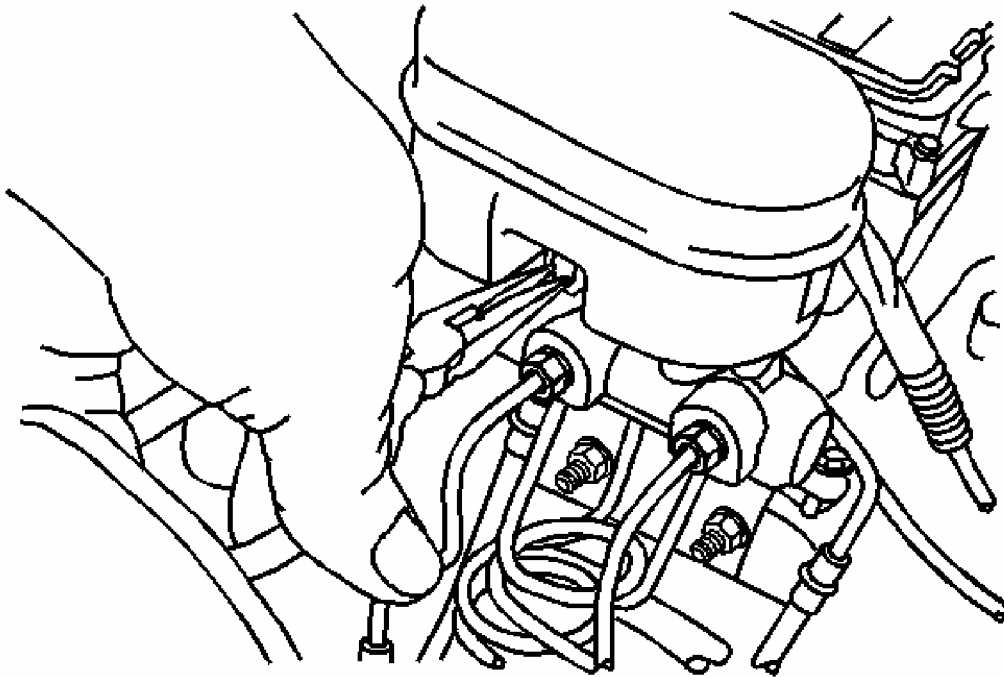
**Fig. 28: Air Intake Tube Routing**  
Courtesy of GENERAL MOTORS CORP.

1. Remove the air cleaner intake duct.



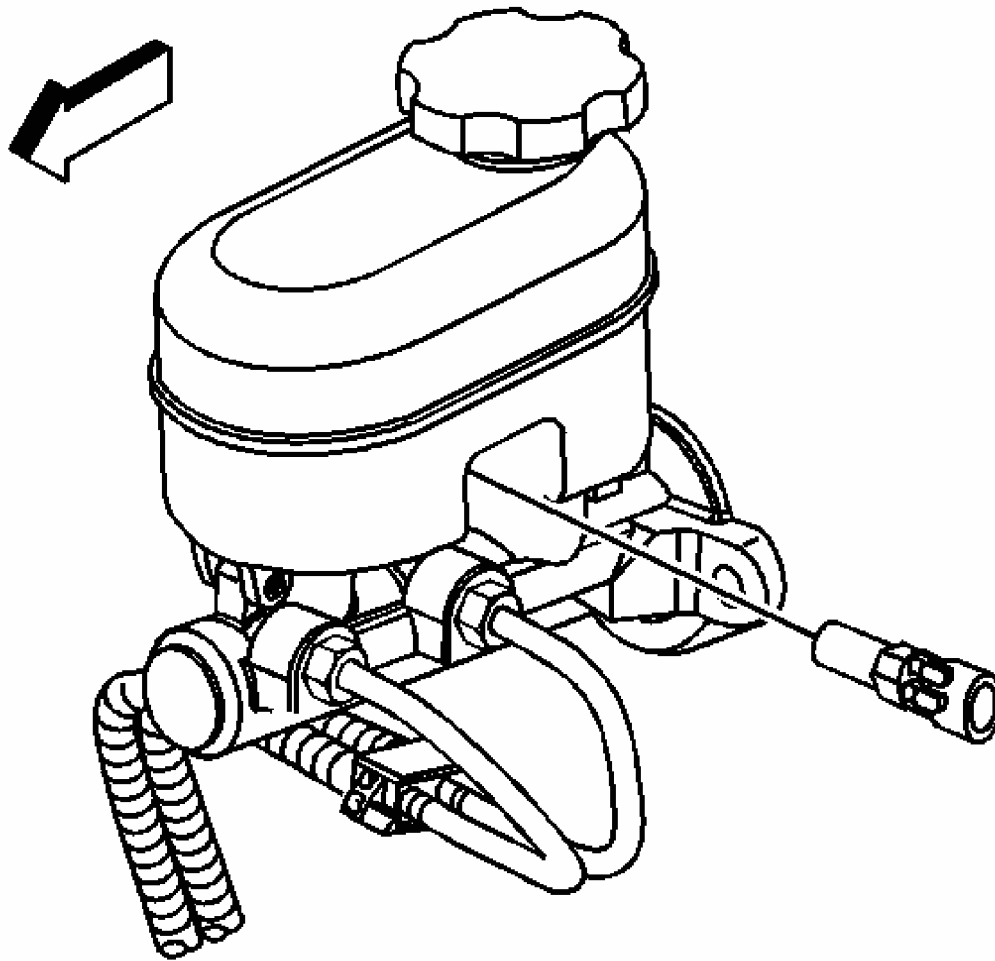
**Fig. 29: Locating Electrical Connector For Fluid Level Sensor**  
Courtesy of GENERAL MOTORS CORP.

2. Disconnect the electrical connector from the fluid level sensor.



**Fig. 30: Compressing Locking Tabs On Fluid Level Sensor**  
**Courtesy of GENERAL MOTORS CORP.**

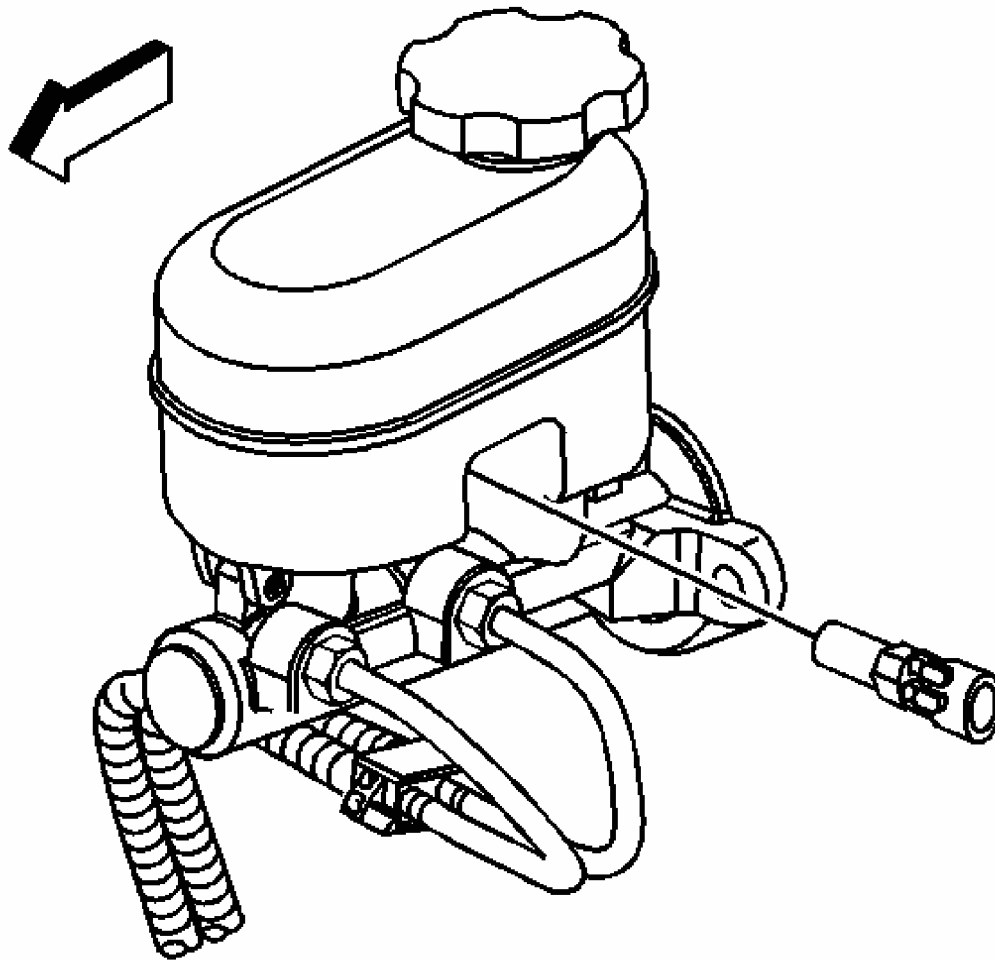
3. Using a pair of needle nose pliers, compress the locking tabs on the fluid level sensor



**Fig. 31: View Of Fluid Level Sensor**  
**Courtesy of GENERAL MOTORS CORP.**

4. Remove the brake fluid level sensor from the reservoir.

**Installation Procedure**

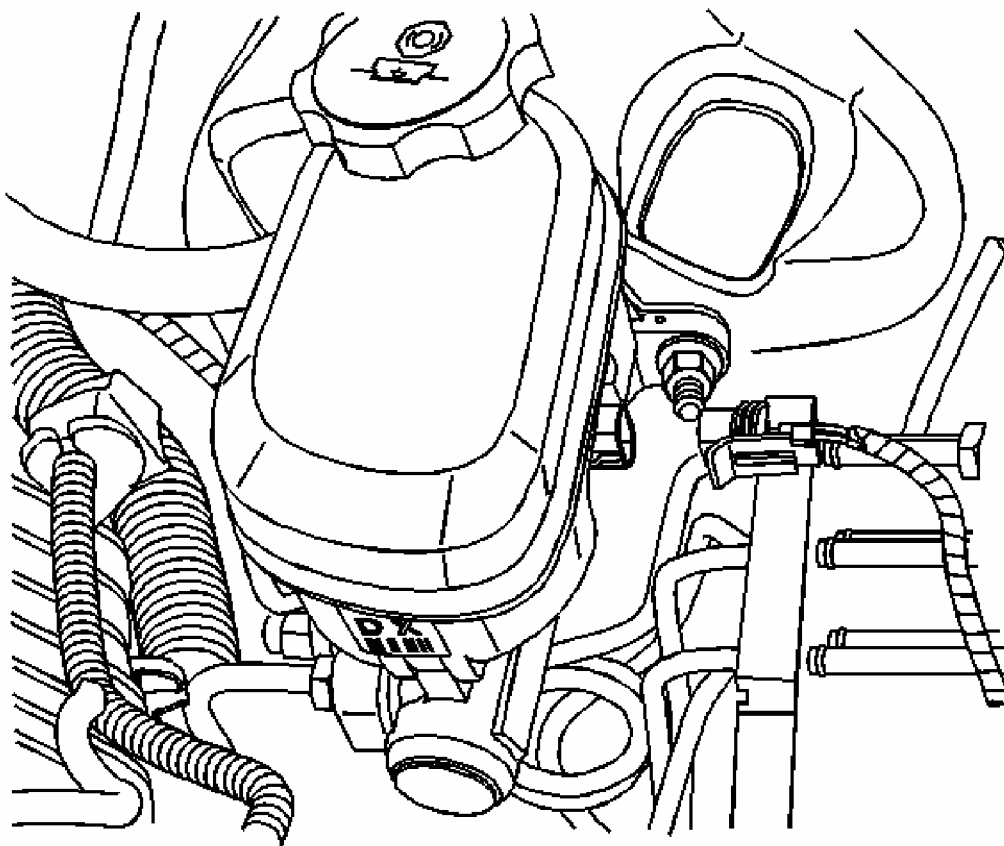


**Fig. 32: View Of Fluid Level Sensor**  
Courtesy of GENERAL MOTORS CORP.

**IMPORTANT: A snap should be felt or heard when installing the brake fluid level sensor into the reservoir,**

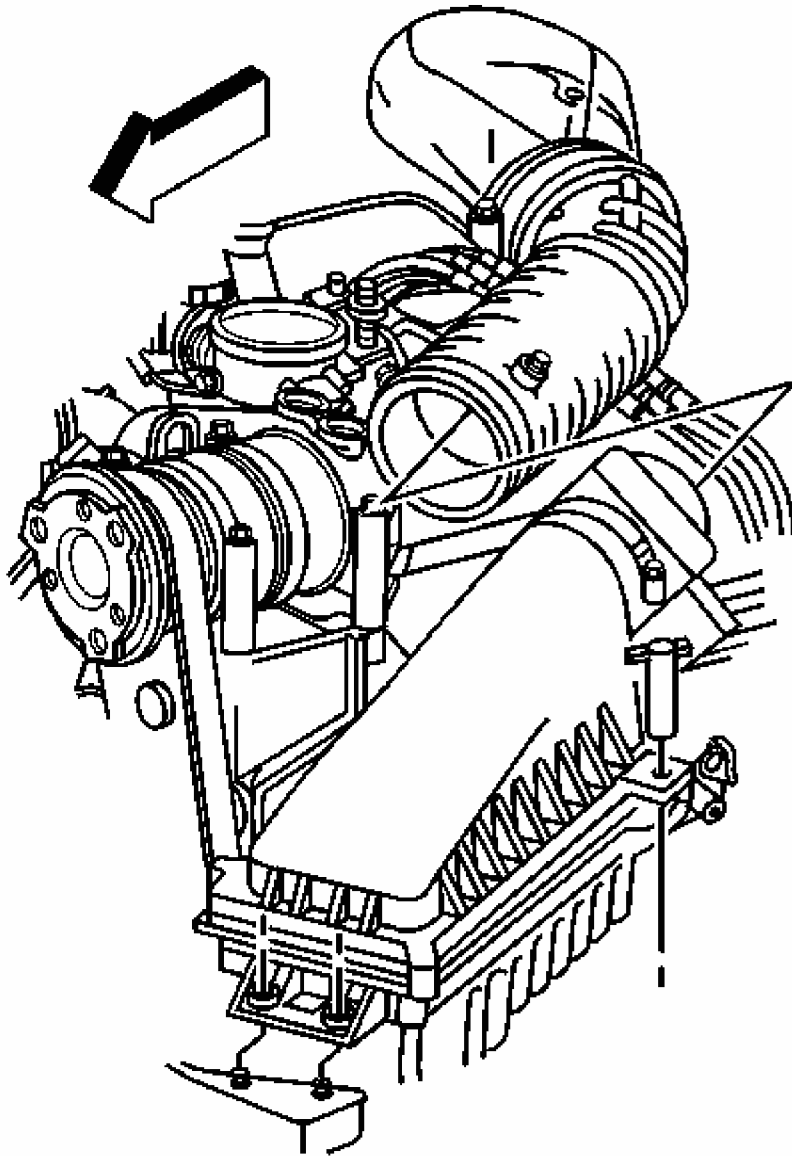
1. Install the brake fluid level sensor in the reservoir.





**Fig. 33: Locating Electrical Connector For Fluid Level Sensor**  
Courtesy of GENERAL MOTORS CORP.

2. Install the electrical connector to the switch.



**Fig. 34: Air Intake Tube Routing**  
Courtesy of GENERAL MOTORS CORP.

3. Install the air intake duct.

## **BRAKE PEDAL ASSEMBLY REPLACEMENT**

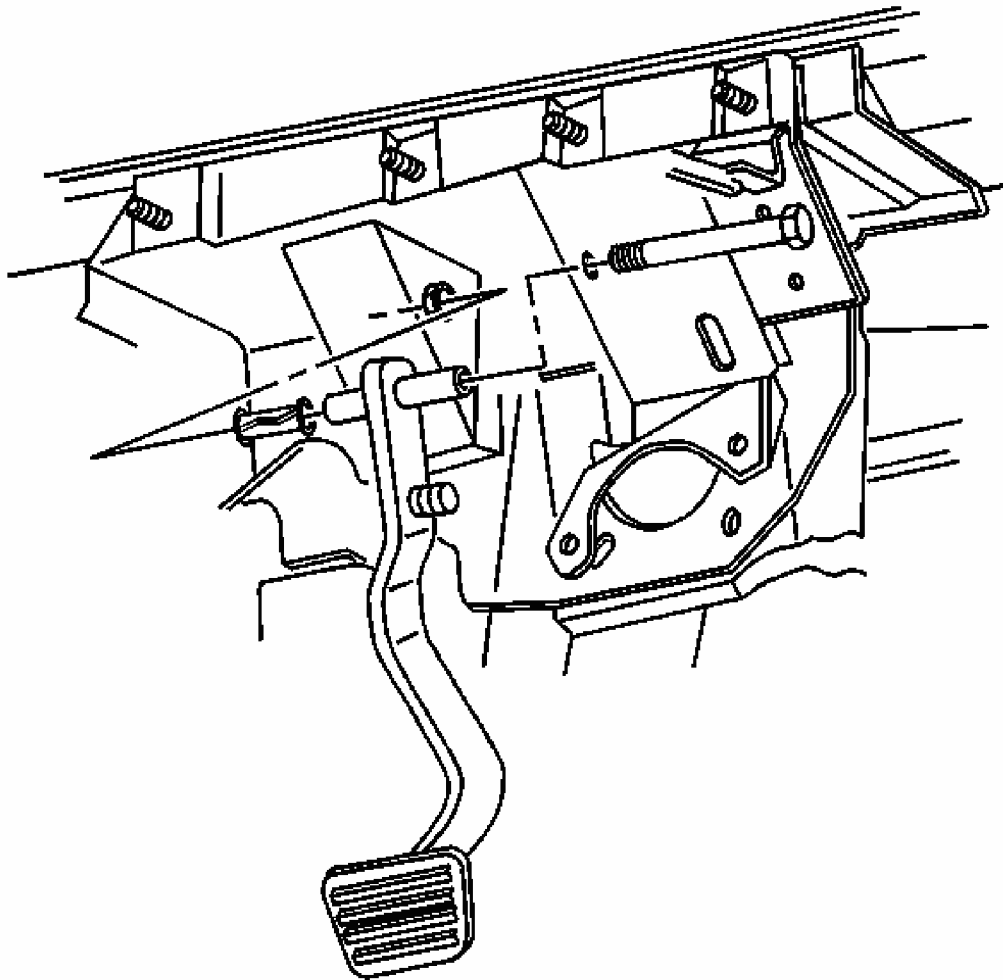
### **Removal Procedure**

1. Remove the steering column at the support bracket. Refer to **Bracket Replacement -**

Mitchell Repair

Saturday, December 13, 2008 21:10: VIRUS  
ALERT!

**Steering Column** in Instrument Panel, Gage and Console.



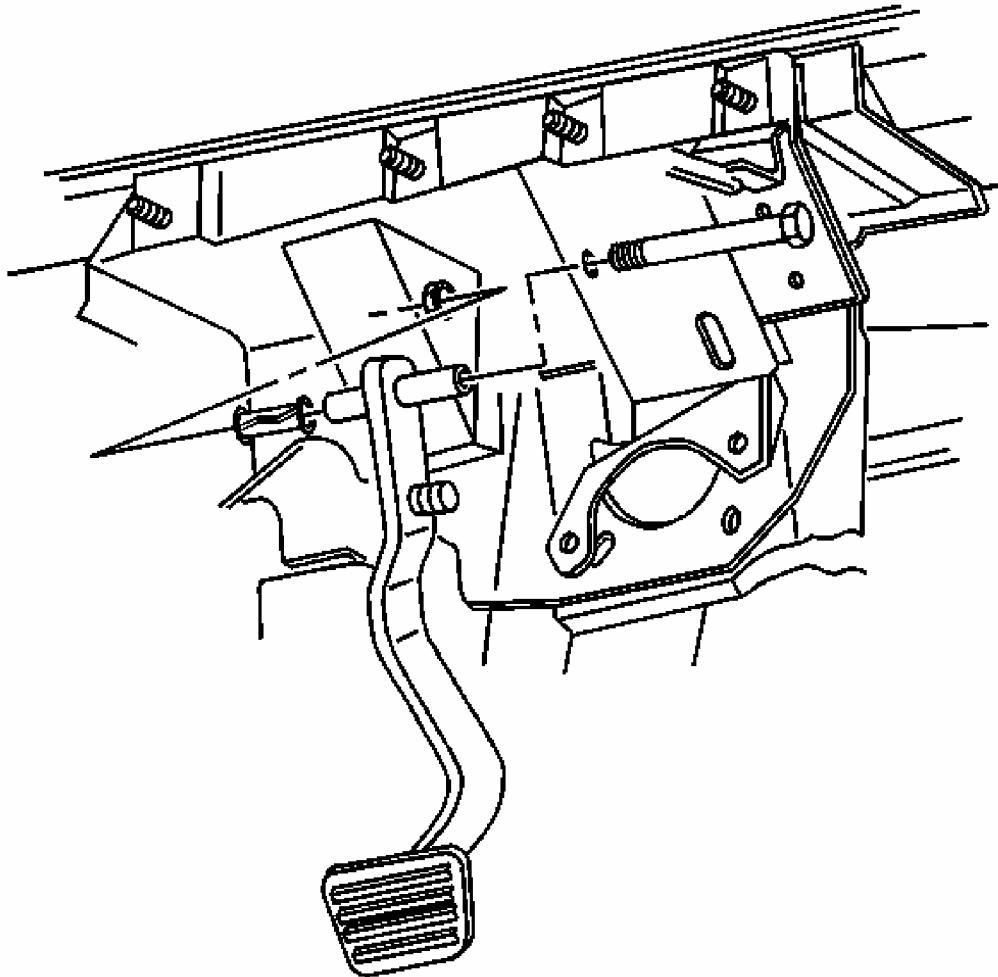
**Fig. 35: View Of Brake Pedal Assembly**  
**Courtesy of GENERAL MOTORS CORP.**

2. Remove the brake pedal pivot bolt and discard the bolt.
3. Remove the brake pedal.
4. Inspect the brake pedal pivot bushing for damage or wear.

#### **Installation Procedure**

1. If the brake pedal pivot bushing is damaged or worn, replace the bushing using the following procedure:
  1. Squeeze the end that will be facing the brake pedal pivot nut.

2. Insert the bushing into the pivot hub just enough to hold the bushing in place.
3. Rapidly push the bushing through the hub until the bushing snaps in place.



**Fig. 36: View Of Brake Pedal Assembly**  
Courtesy of GENERAL MOTORS CORP.

2. Install the brake pedal.

**NOTE:** Refer to Fastener Notice in Cautions and Notices.

**IMPORTANT:** The brake pedal pivot bolt is a prevailing torque bolt and must be replaced each time the bolt is removed.

3. Install the new brake pedal pivot bolt and the brake pedal pivot nut.

**Tighten:** Tighten the brake pedal pivot bolt to 25 N.m (19 lb ft).

4. Install the steering column. Refer to **Bracket Replacement - Steering Column** in Instrument Panel, Gages and Console.

## **BRAKE PIPE REPLACEMENT**

### **Tools Required**

**J 45405** Pipe Flaring Tool Kit. See **Special Tools and Equipment**.

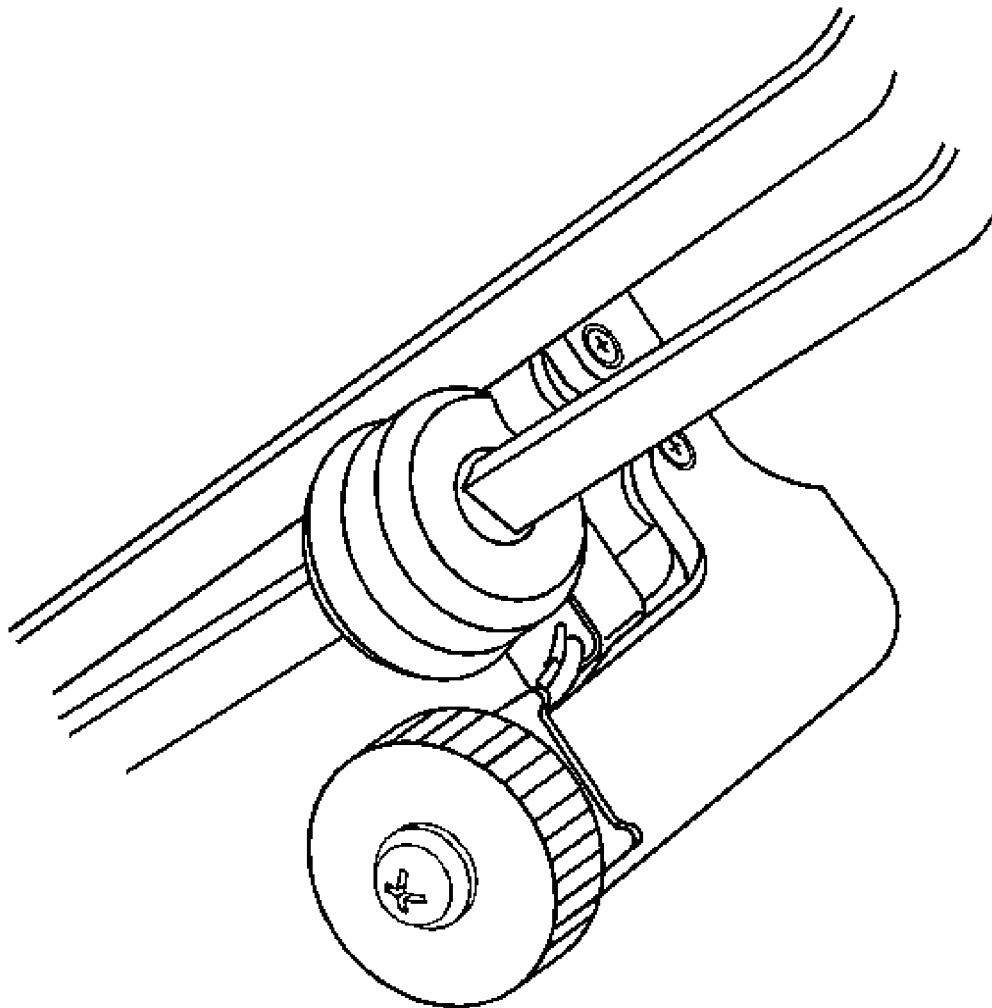
**CAUTION:** Refer to **Brake Fluid Irritant Caution** in Cautions and Notices.

**CAUTION:** Always use double walled steel brake pipe when replacing brake pipes. The use of any other pipe is not recommended and may cause brake system failure. Carefully route and retain replacement brake pipes. Always use the correct fasteners and the original location for replacement brake pipes. Failure to properly route and retain brake pipes may cause damage to the brake pipes and cause brake system failure.

**NOTE:** Refer to **Brake Fluid Effects on Paint and Electrical Components Notice** in Cautions and Notices.

**IMPORTANT:** When servicing brake pipes, note the following:

- If sectioning brake pipe, use replacement pipe of the same type and outside diameter.
- Use fittings of the appropriate size and type.
- Only create flares of the same type or design as originally equipped on the vehicle.



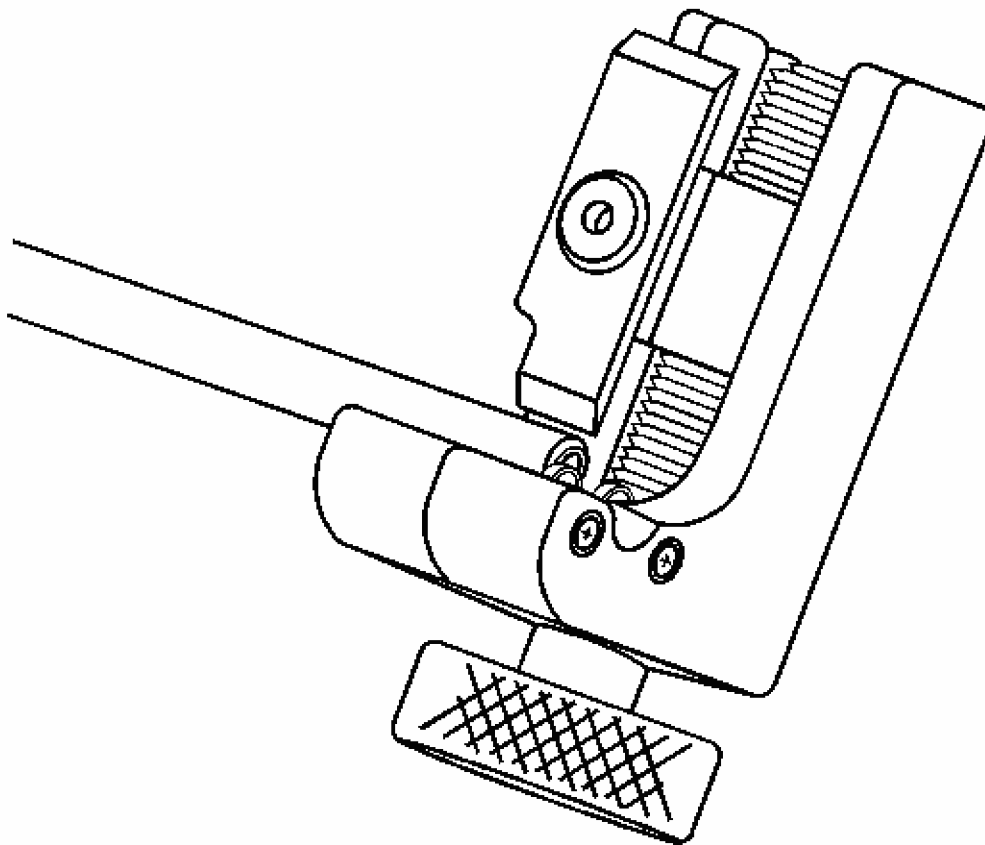
**Fig. 37: Sectioning Brake Pipe Using Pipe Cutter**  
**Courtesy of GENERAL MOTORS CORP.**

1. Inspect the section of brake pipe to be replaced.
2. Release the brake pipe to be replaced from the retainers, as required.
3. Select an appropriate location to section the brake pipe, if necessary.
  - Allow adequate clearance in order to maneuver the **J 45405** .
  - Avoid sectioning the brake pipe at bends or mounting points.
4. Using a string or wire, measure the length of the pipe to be replaced including all pipe bends.
5. Add to the measurement taken the appropriate additional length required for each flare to be created.

**Specification:** 6.35 mm (0.250 in) for 4.76 mm (3/16 in) diameter pipe

**IMPORTANT:** Ensure that the brake pipe end to be flared is cut at a square, 90 degree angle to the pipe length.

6. Using the pipe cutter included in the **J 45405** , carefully cut the brake pipe squarely to the measured length.
7. Remove the sectioned brake pipe from the vehicle.
8. Select the appropriate size of brake pipe and tube nuts, as necessary. The brake pipe outside diameter determines brake pipe size.



**Fig. 38: Stripping Nylon Coating From Brake Pipe Ends**  
Courtesy of GENERAL MOTORS CORP.

9. Strip the nylon coating from the brake pipe ends to be flared, if necessary.
  - Select the appropriate blade on the coating stripping tool included in the **J 45405** ,

by unthreading the blade block from the stripping tool and installing the block with the desired blade facing the tool rollers.

**Specification:** 6.35 mm (0.250 in) blade for 4.76 mm (3/16 in) diameter pipe

- Insert the brake pipe end to be flared into the stripping tool to the depth of the ledge on the tool rollers.
- While holding the brake pipe firmly against the stripping tool roller ledges, rotate the thumbwheel of the tool until the blade contacts the brake pipe coated surface.

**IMPORTANT: Do not gouge the metal surface of the brake pipe.**

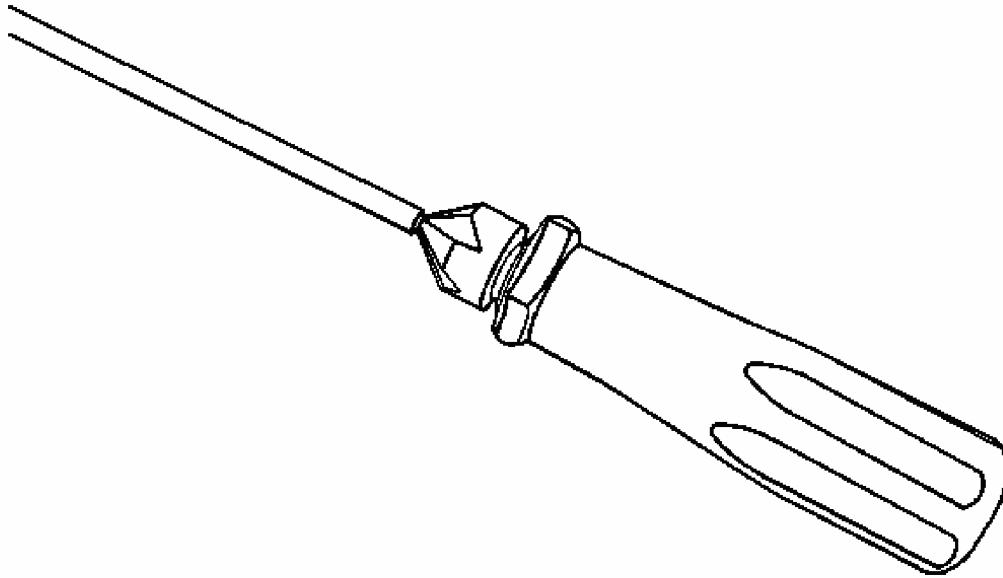
- Rotate the stripping tool in a clockwise direction, ensuring that the brake pipe end remains against the tool roller ledges.
- After each successive revolution of the stripping tool, carefully rotate the thumbwheel of the tool clockwise, in order to continue stripping the coating from the brake pipe until the metal pipe surface is exposed.
- Loosen the thumbwheel of the tool and remove the brake pipe.

**IMPORTANT: Ensure that all loose remnants of the nylon coating have been removed from the brake pipe.**

- Inspect the stripped end of the brake pipe to ensure that the proper amount of coating has been removed.

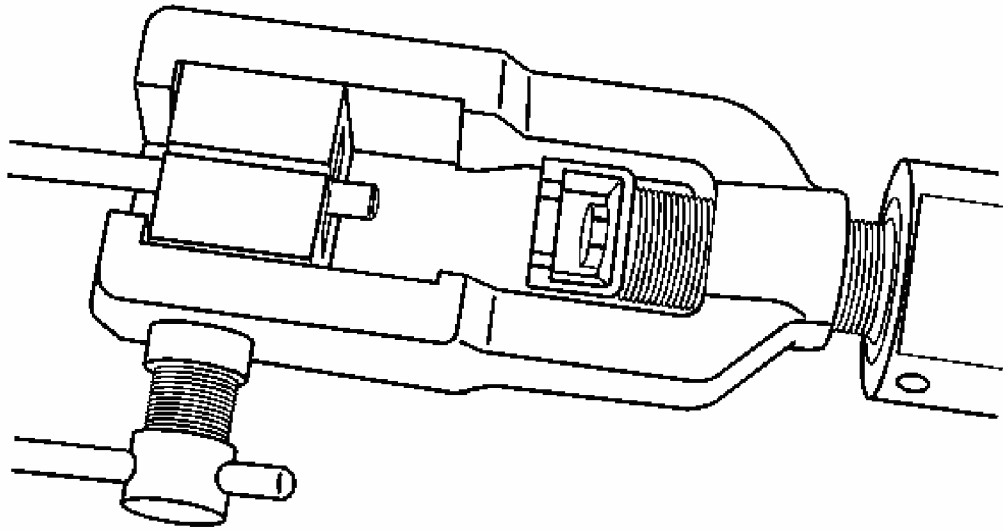
**Specification:** 6.35 mm (0.250 in) for 4.76 mm (3/16 in) diameter pipe





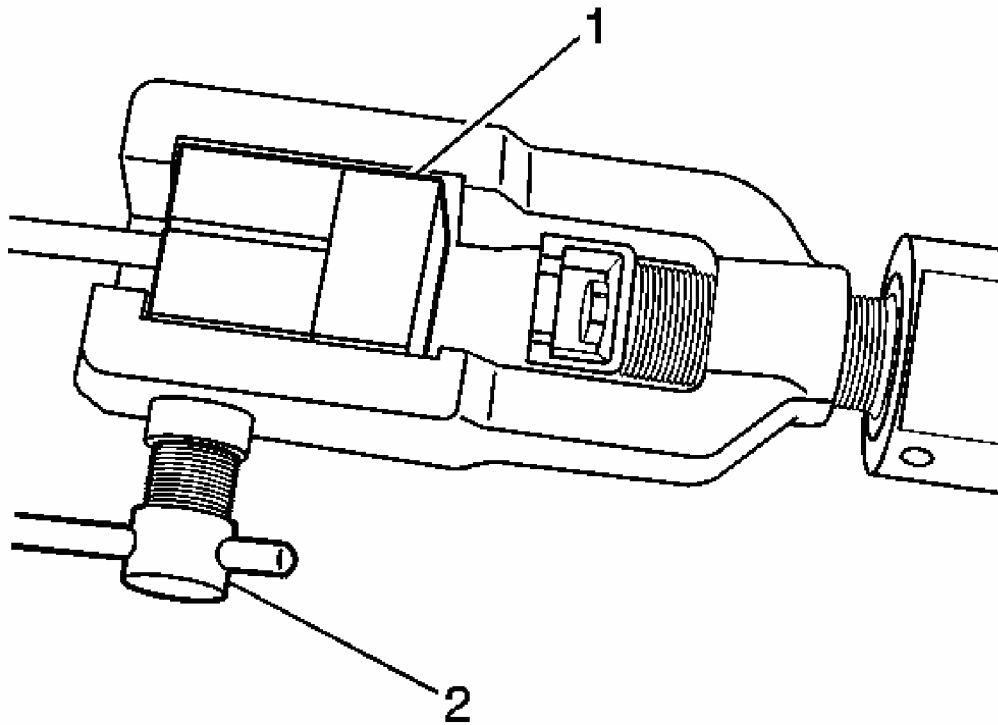
**Fig. 39: Chamfering Pipe Using De-Burring Tool**  
**Courtesy of GENERAL MOTORS CORP.**

10. Chamfer the inside and outside diameter of the pipe with the de-burring tool included in the **J 45405** .
11. Install the tube nuts on the brake pipe, noting their orientation.
12. Clean the brake pipe and the **J 45405** of lubricant, contaminants, and debris.



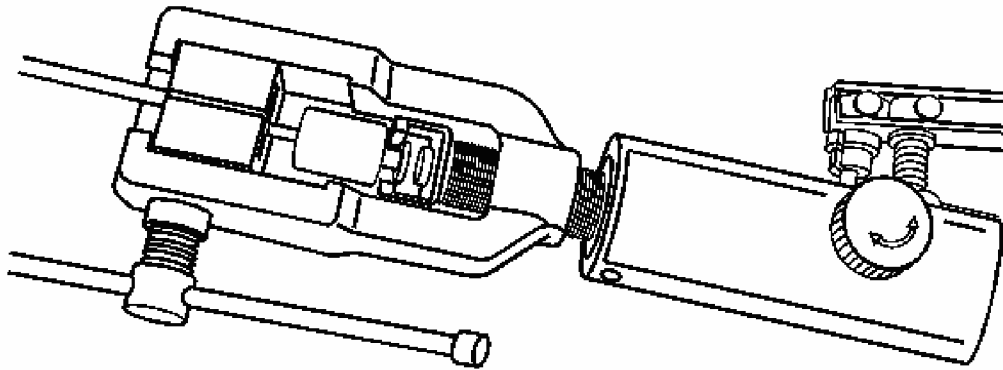
**Fig. 40: Installing Die Halves Into Die Cage**  
**Courtesy of GENERAL MOTORS CORP.**

13. Loosen the die clamping screw of the **J 45405** .
14. Select the corresponding die set and install the die halves into the die cage with the full, flat face of one die facing the clamping screw, and the counterbores of both dies facing the forming ram.



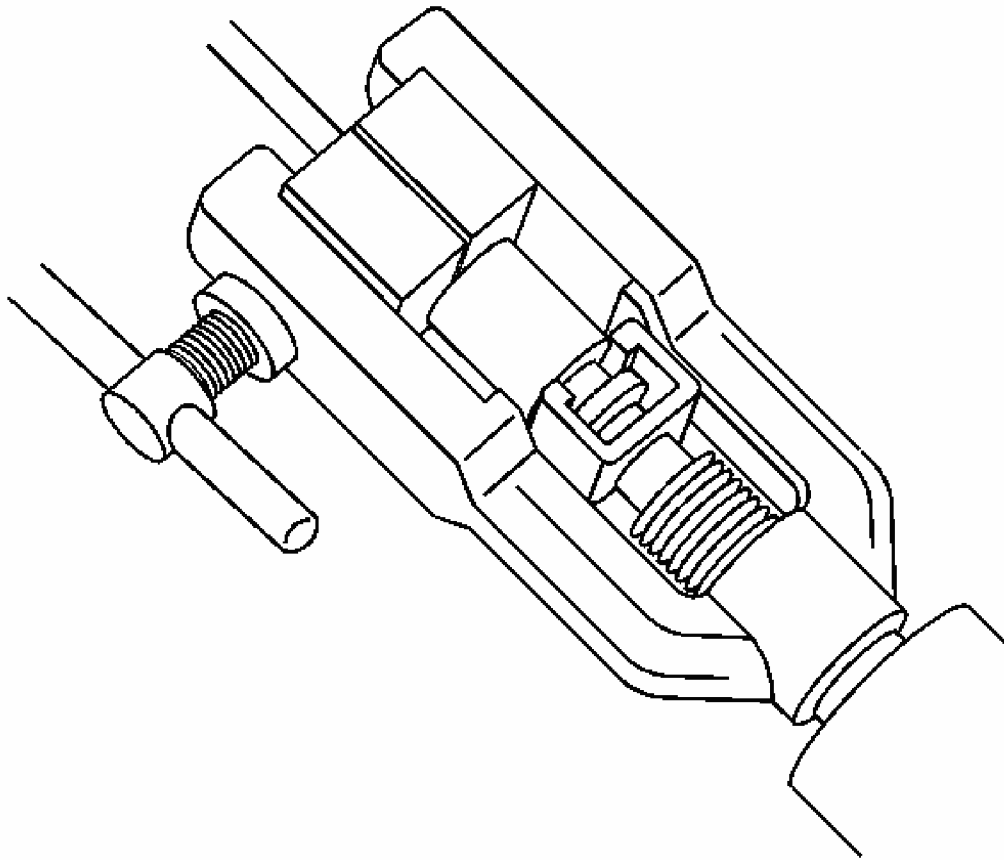
**Fig. 41: View Of Clamping Screw & Unused Die**  
**Courtesy of GENERAL MOTORS CORP.**

15. Place the flat face of an unused die (1) against the die halves in the clamping cage and hold firmly against the counterbored face of the dies.
16. Insert the prepared end of the pipe to be flared through the back of the dies until the pipe is seated against the flat surface of the unused die (1).
17. Remove the unused die (1).
18. Ensure that the rear of both dies are seated firmly against the enclosed end of the die cage.
19. Firmly hand tighten the clamping screw (2) against the dies.



**Fig. 42: Rotating J 45405 To Bottom Against Die Cage**  
**Courtesy of GENERAL MOTORS CORP.**

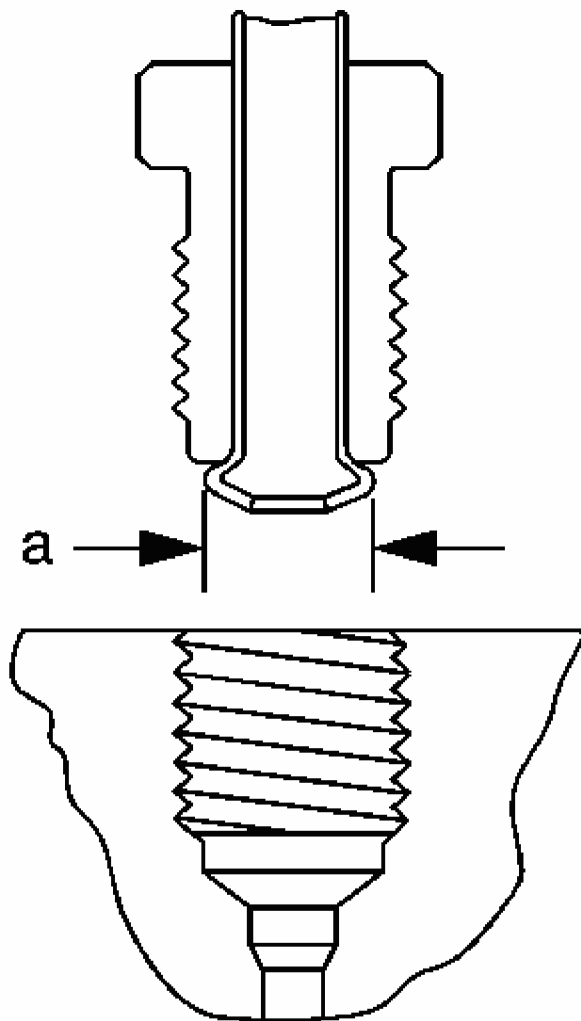
20. Select the appropriate forming mandrel and place into the forming ram.
21. Rotate the hydraulic fluid control valve clockwise to the closed position.
22. Rotate the body of the **J 45405** until it bottoms against the die cage.



**Fig. 43: Bottoming Forming Mandrel Against Clamping Dies Using Pipe Flaring Tool**

**Courtesy of GENERAL MOTORS CORP.**

23. While guiding the forming mandrel into the exposed end of pipe to be flared, operate the lever of the **J 45405** until the forming mandrel bottoms against the clamping dies.
24. Rotate the hydraulic fluid control valve counterclockwise to the open position to allow the hydraulic forming ram to retract.
25. Loosen the die clamping screw and remove the dies and pipe.
26. If necessary, lightly tap the dies until the die halves separate.



**Fig. 44: Inspecting Brake Pipe Flare Diameter**  
Courtesy of GENERAL MOTORS CORP.

27. Inspect the brake pipe flare for correct shape and diameter (a).

**Specification:** 7.10 mm (0.279 in) +/- 0.18 mm (0.007 in) flare diameter for 4.76 mm (3/16 in) diameter pipe

28. If necessary, using the removed section of pipe as a template, shape the new pipe with a suitable brake pipe bending tool.

**IMPORTANT:** When installing the pipe, maintain a clearance of 19 mm

**(3/4 in) from all moving or vibrating components.**

29. Install the pipe to the vehicle with the appropriate brake pipe unions as required.
30. If previously released, secure the brake pipe to the retainers.
31. Bleed the hydraulic brake system. Refer to **Hydraulic Brake System Bleeding (Manual)** or **Hydraulic Brake System Bleeding (Pressure)**.
32. With the aid of an assistant, inspect the brake pipe flares for leaks by starting the engine and applying the brakes.

## **BRAKE HOSE REPLACEMENT - FRONT**

### **Removal Procedure**

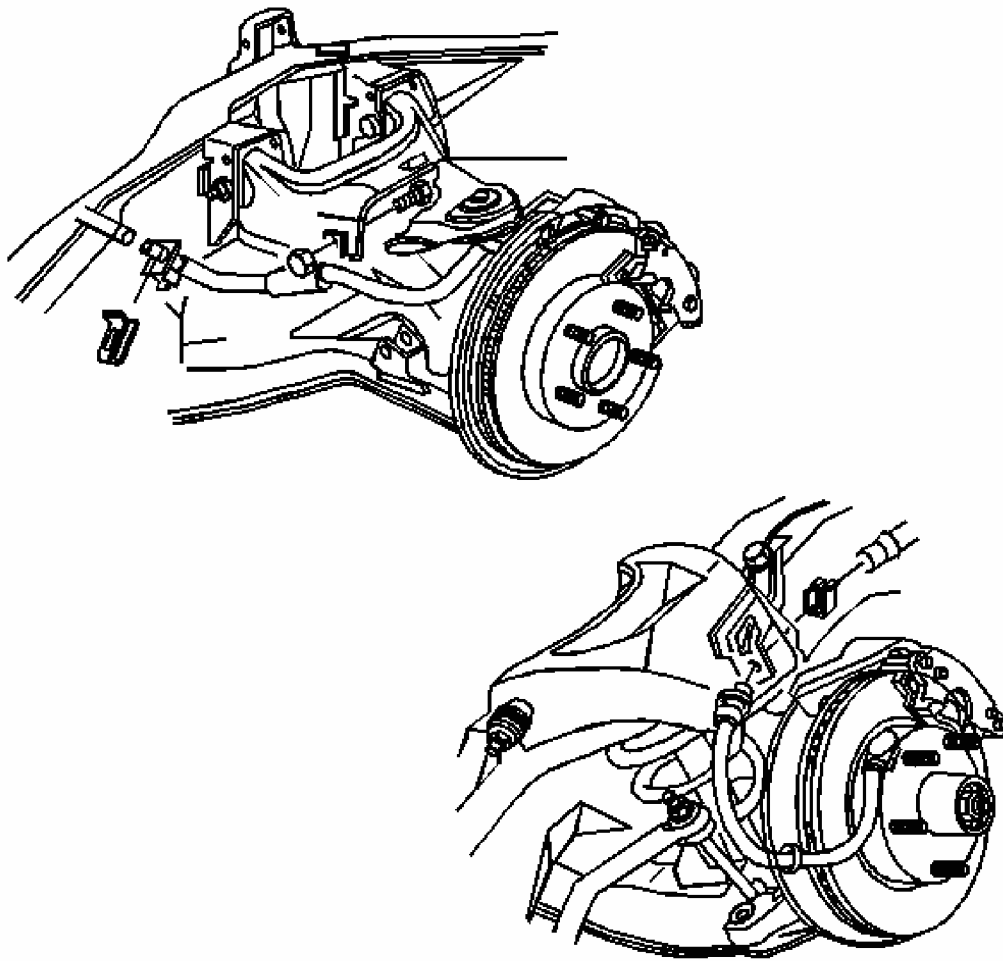
**CAUTION:** Refer to **Brake Dust Caution** in Cautions and Notices.

**CAUTION:** Refer to **Brake Fluid Irritant Caution** in Cautions and Notices.

**NOTE:** Refer to **Brake Fluid Effects on Paint and Electrical Components Notice** in Cautions and Notices.

**IMPORTANT:** The following service procedure covers vehicles equipped with both the single and dual piston calipers.

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the front tires and wheels assembly. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
3. Clean all dirt and foreign material from the brake hoses and the brake pipes.



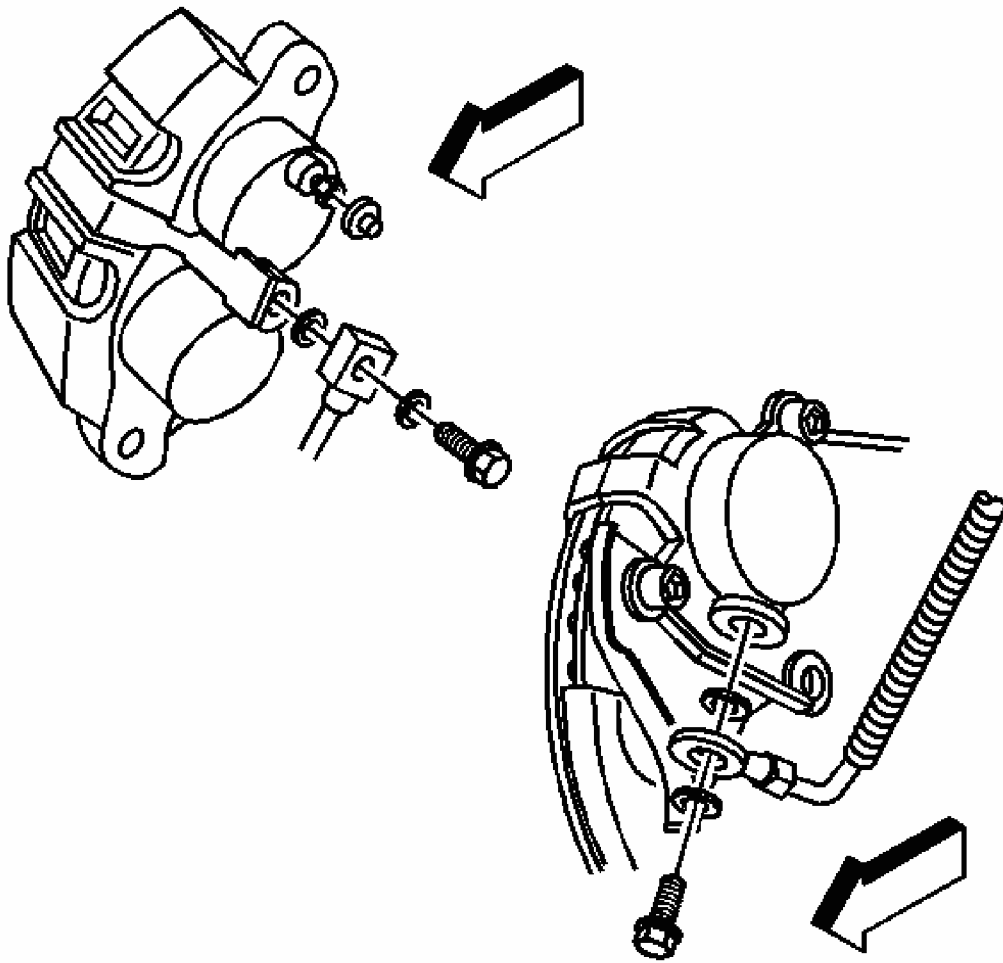
**Fig. 45: View Of Brake Pipe At Brake Hose**  
**Courtesy of GENERAL MOTORS CORP.**

4. Using a backup wrench on the brake pipe fitting, disconnect the brake pipe from the brake hose.

**IMPORTANT: Install a plug or cap in the brake pipe to the exposed brake pipe fitting end in order to prevent fluid loss and contamination.**

5. Disconnect the brake pipe fitting from the flex brake hose at the frame.
6. Remove the front brake hose retainer at the frame bracket.

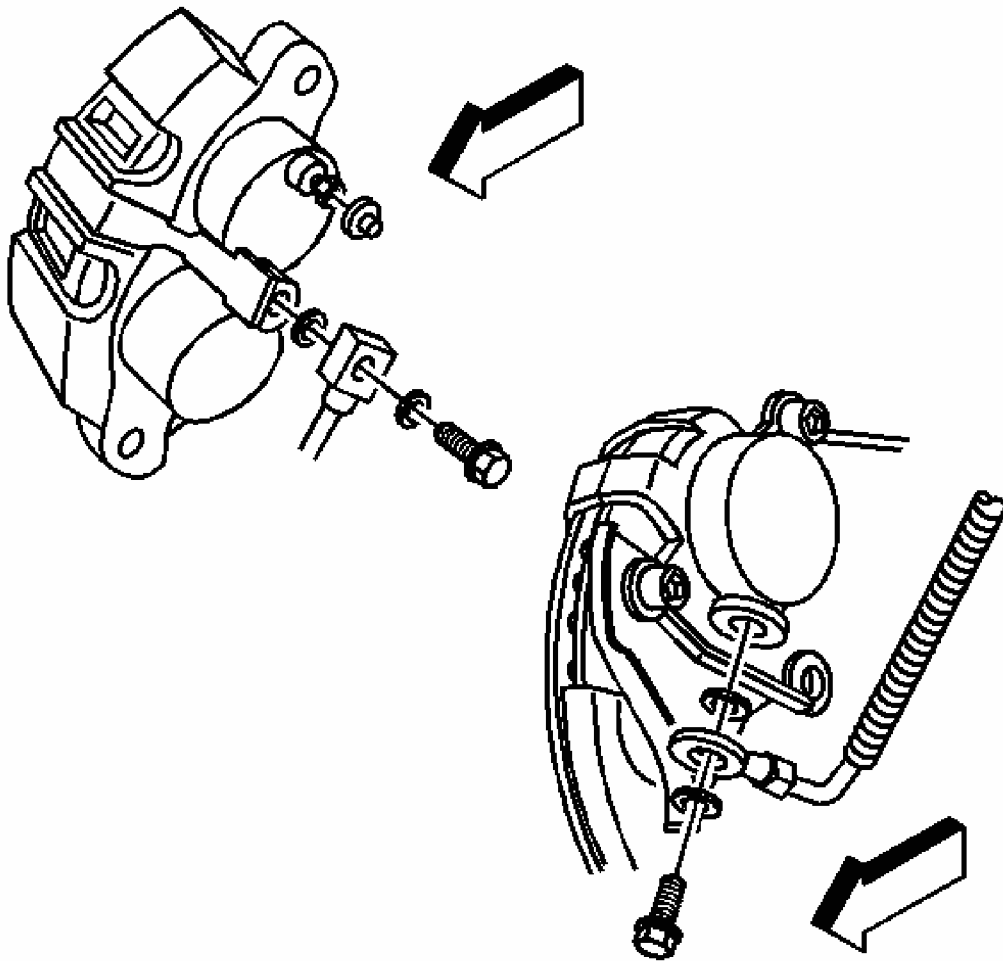




**Fig. 46: View Of Brake Hose At Brake Caliper**  
**Courtesy of GENERAL MOTORS CORP.**

7. Remove the hose front flex brake hose bolt and gaskets from the brake caliper.
8. Remove the brake hose from the brake caliper.
9. Remove the copper gaskets from the brake hose bolt. These gaskets may stick to the brake caliper or the brake hose bolt.

#### **Installation Procedure**



**Fig. 47: View Of Brake Hose At Brake Caliper**  
Courtesy of GENERAL MOTORS CORP.

**IMPORTANT: DO NOT** reuse the old copper gaskets. Always use **NEW** metal copper gaskets.

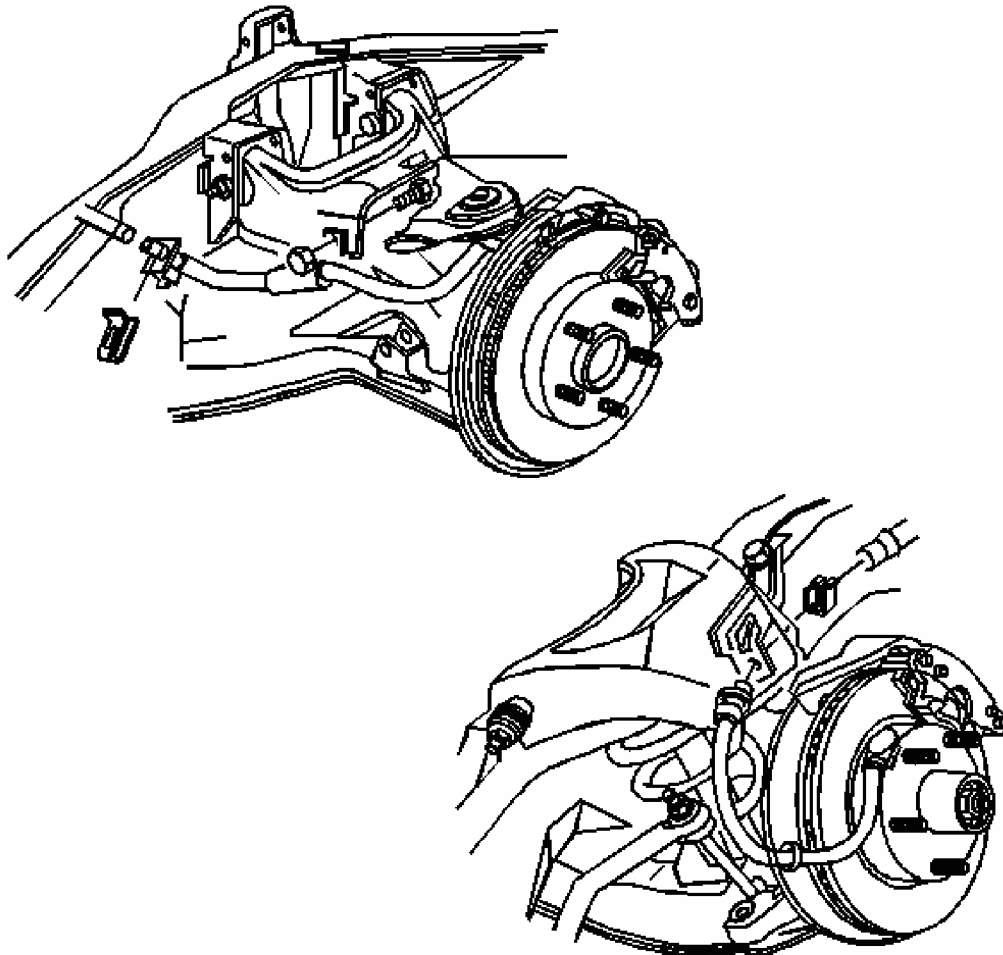
1. Install the copper gaskets on the brake hose.

**NOTE:** Refer to Fastener Notice in Cautions and Notices.

2. Install the brake caliper bolt to the brake caliper.

**Tighten:** Tighten the brake hose bolt to 44 N.m (32 lb ft).

3. Remove the plug or cap from the exposed brake pipe fitting.



**Fig. 48: View Of Brake Pipe At Brake Hose**  
Courtesy of GENERAL MOTORS CORP.

4. Install the brake hose to the brake pipe.

**IMPORTANT:** Ensure that the brake hose is not twisted and does not come in contact with any of the suspension components.

5. Using a backup wrench on the brake pipe fitting, tighten the brake hose fitting.

**Tighten:** Tighten the brake hose fitting to 17 N.m (13 lb ft).

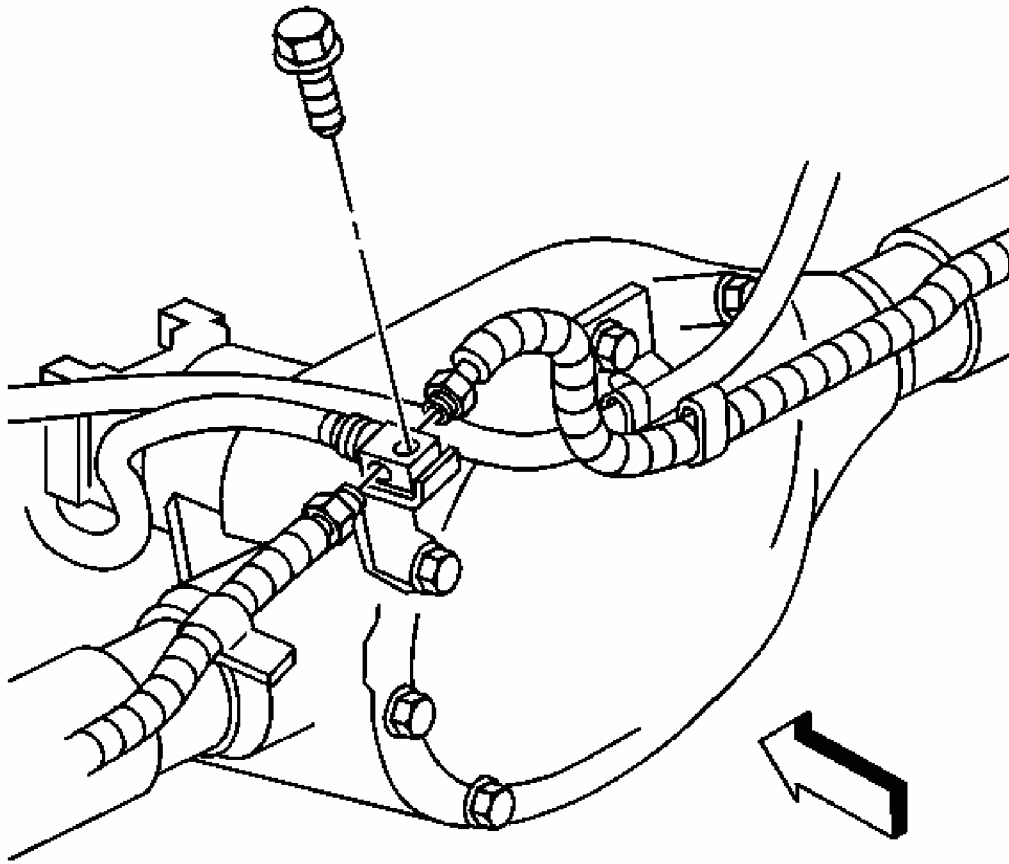
6. Install the brake pipe retaining clips.

7. Bleed the hydraulic brake system. Refer to **Hydraulic Brake System Bleeding (Manual)** or **Hydraulic Brake System Bleeding (Pressure)**.
8. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** in Tires and Wheels.
9. Lower the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.

**BRAKE HOSE REPLACEMENT - REAR****Removal Procedure**

**CAUTION: Refer to Brake Fluid Irritant Caution in Cautions and Notices.**

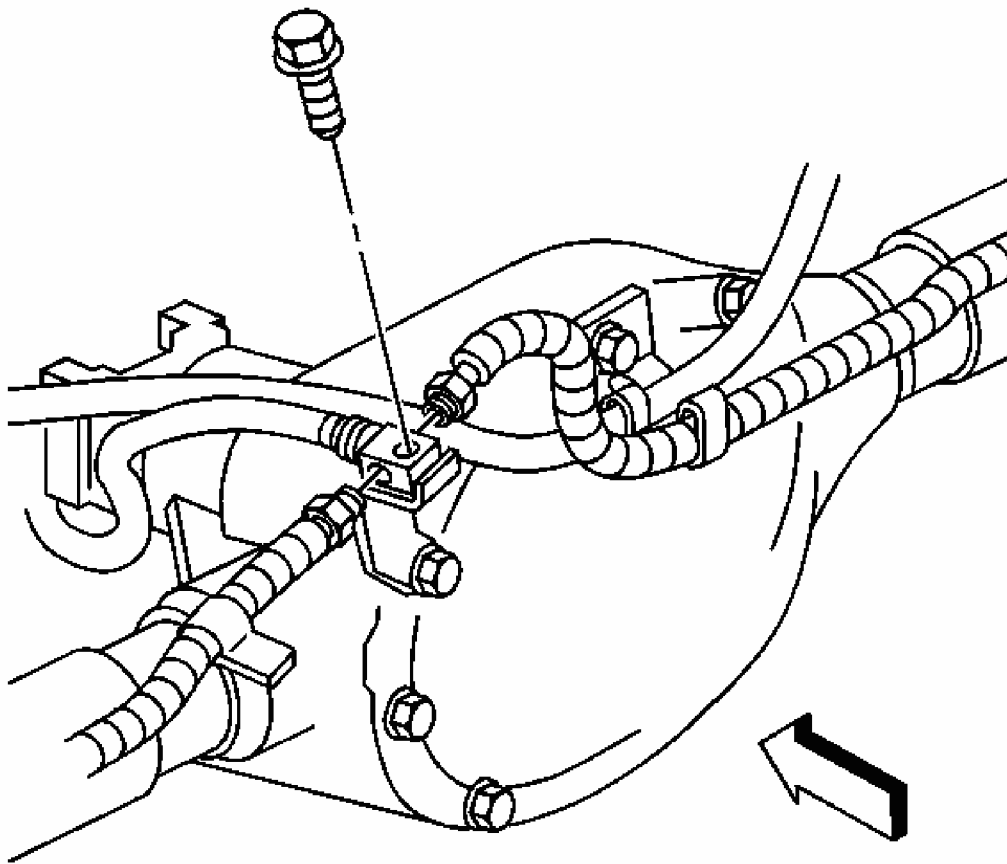
1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Support the vehicle with safety stands.
3. Clean the dirt and foreign material from the brake hose and brake pipe fitting.
4. Install a rubber cap or plug on the brake pipe fitting in order to prevent brake fluid loss and contamination.
5. Using a backup wrench, disconnect the brake hose and brake pipe fitting.
6. Remove the brake hose retainer.
7. Remove the brake pipe from the brake junction block.



**Fig. 49: View Of Brake Junction Block Mounting Bolt**  
**Courtesy of GENERAL MOTORS CORP.**

8. Remove the brake junction block mounting bolt.
9. Remove the brake hose.

**Installation Procedure**



**Fig. 50: View Of Brake Junction Block Mounting Bolt**  
Courtesy of GENERAL MOTORS CORP.

**NOTE:** Refer to Fastener Notice in Cautions and Notices.

**IMPORTANT:** After installation, ensure that the rear flex hose is not twisted and that the rear flex hose does not come in contact with any other components.

1. Install the brake junction block mounting bolt.

**Tighten:** Tighten the brake junction block bolt to 17 N.m (13 lb ft).

2. Install the brake hose to the brake junction block.

**Tighten:** Tighten the brake hose fitting to 17 N.m (13 lb ft).

3. Install the brake hose fitting to the brake pipe fitting.

**Tighten:** Tighten the brake hose fitting to 17 N.m (13 lb ft).

4. Bleed the hydraulic brake system. Refer to **Hydraulic Brake System Bleeding (Manual)** or **Hydraulic Brake System Bleeding (Pressure)**.
5. Remove the safety stands.
6. Lower the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.

#### HYDRAULIC BRAKE SYSTEM BLEEDING (MANUAL)

**CAUTION:** Refer to **Brake Fluid Irritant Caution** in Cautions and Notices.

**NOTE:** Refer to **Brake Fluid Effects on Paint and Electrical Components Notice** in Cautions and Notices.

**NOTE:** When adding fluid to the brake master cylinder reservoir, use only Delco Supreme 11®, GM P/N 12377967 (Canadian P/N 992667), or equivalent DOT-3 brake fluid from a clean, sealed brake fluid container. The use of any type of fluid other than the recommended type of brake fluid, may cause contamination which could result in damage to the internal rubber seals and/or rubber linings of hydraulic brake system components.

1. Place a clean shop cloth beneath the brake master cylinder to prevent brake fluid spills.
2. With the ignition OFF and the brakes cool, apply the brakes 3-5 times, or until the brake pedal effort increases significantly, in order to deplete the brake booster power reserve.
3. If you have performed a brake master cylinder bench bleeding on this vehicle, or if you disconnected the brake pipes from the master cylinder, you must perform the following steps:
  - A. Ensure that the brake master cylinder reservoir is full to the maximum-fill level. If necessary add Delco Supreme 11®, GM P/N 12377967 (Canadian P/N 992667), or equivalent DOT-3 brake fluid from a clean, sealed brake fluid container.

If removal of the reservoir cap and diaphragm is necessary, clean the outside of the reservoir on and around the cap prior to removal.

- B. With the rear brake pipe installed securely to the master cylinder, loosen and separate the front brake pipe from the front port of the brake master cylinder.
- C. Allow a small amount of brake fluid to gravity bleed from the open port of the

master cylinder.

- D. Reconnect the brake pipe to the master cylinder port and tighten securely.
  - E. Have an assistant slowly depress the brake pedal fully and maintain steady pressure on the pedal.
  - F. Loosen the same brake pipe to purge air from the open port of the master cylinder.
  - G. Tighten the brake pipe, then have the assistant slowly release the brake pedal.
  - H. Wait 15 seconds, then repeat steps 3.3-3.7 until all air is purged from the same port of the master cylinder.
  - I. With the front brake pipe installed securely to the master cylinder - after all air has been purged from the front port of the master cylinder - loosen and separate the rear brake pipe from the master cylinder, then repeat steps 3.3-3.8.
  - J. After completing the final master cylinder port bleeding procedure, ensure that both of the brake pipe-to-master cylinder fittings are properly tightened.
4. Fill the brake master cylinder reservoir with Delco Supreme 11®, GM P/N 12377967 (Canadian P/N 992667), or equivalent DOT-3 brake fluid from a clean, sealed brake fluid container. Ensure that the brake master cylinder reservoir remains at least half-full during this bleeding procedure. Add fluid as needed to maintain the proper level.

Clean the outside of the reservoir on and around the reservoir cap prior to removing the cap and diaphragm.

5. Install a proper box-end wrench onto the RIGHT REAR wheel hydraulic circuit bleeder valve.
6. Install a transparent hose over the end of the bleeder valve.
7. Submerge the open end of the transparent hose into a transparent container partially filled with Delco Supreme 11®, GM P/N 12377967 (Canadian P/N 992667), or equivalent DOT-3 brake fluid from a clean, sealed brake fluid container.
8. Have an assistant slowly depress the brake pedal fully and maintain steady pressure on the pedal.
9. Loosen the bleeder valve to purge air from the wheel hydraulic circuit.
10. Tighten the bleeder valve, then have the assistant slowly release the brake pedal.
11. Wait 15 seconds, then repeat steps 8-10 until all air is purged from the same wheel hydraulic circuit.
12. With the right rear wheel hydraulic circuit bleeder valve tightened securely - after all air has been purged from the right rear hydraulic circuit - install a proper box-end wrench onto the LEFT REAR wheel hydraulic circuit bleeder valve.
13. Install a transparent hose over the end of the bleeder valve, then repeat steps 7-11.
14. With the left rear wheel hydraulic circuit bleeder valve tightened securely - after all air has been purged from the left rear hydraulic circuit - install a proper box-end wrench onto the RIGHT FRONT wheel hydraulic circuit bleeder valve.



15. Install a transparent hose over the end of the bleeder valve, then repeat steps 7-11.
16. With the right front wheel hydraulic circuit bleeder valve tightened securely - after all air has been purged from the right front hydraulic circuit - install a proper box-end wrench onto the LEFT FRONT wheel hydraulic circuit bleeder valve.
17. Install a transparent hose over the end of the bleeder valve, then repeat steps 7-11.
18. After completing the final wheel hydraulic circuit bleeding procedure, ensure that each of the 4 wheel hydraulic circuit bleeder valves are properly tightened.
19. Fill the brake master cylinder reservoir to the maximum-fill level with Delco Supreme 11®, GM P/N 12377967 (Canadian P/N 992667), or equivalent DOT-3 brake fluid from a clean, sealed brake fluid container.
20. Slowly depress and release the brake pedal. Observe the feel of the brake pedal.
21. If the brake pedal feels spongy, repeat the bleeding procedure again. If the brake pedal still feels spongy after repeating the bleeding procedure, perform the following steps:
  1. Inspect the brake system for external leaks. Refer to **Brake System External Leak Inspection**.
  2. Pressure bleed the hydraulic brake system in order to purge any air that may still be trapped in the system.
22. Turn the ignition key ON, with the engine OFF. Check to see if the brake system warning lamp remains illuminated.

**IMPORTANT: If the brake system warning lamp remains illuminated, DO NOT allow the vehicle to be driven until it is diagnosed and repaired.**

23. If the brake system warning lamp remains illuminated, refer to **Symptoms - Hydraulic Brakes**.

#### **HYDRAULIC BRAKE SYSTEM BLEEDING (PRESSURE)**

##### **Tools Required**

- **J 29532** Diaphragm Type Brake Pressure Bleeder, or equivalent. See **Special Tools and Equipment**.
- **J 35589-A** Brake Pressure Bleeder Adapter. See **Special Tools and Equipment**.

**CAUTION: Refer to Brake Fluid Irritant Caution in Cautions and Notices.**

**NOTE: Refer to Brake Fluid Effects on Paint and Electrical Components Notice in Cautions and Notices.**

**NOTE:** When adding fluid to the brake master cylinder reservoir, use only Delco Supreme 11®, GM P/N 12377967 (Canadian P/N 992667), or equivalent DOT-3 brake fluid from a clean, sealed brake fluid container. The use of any type of fluid other than the recommended type of brake fluid, may cause contamination which could result in damage to the internal rubber seals and/or rubber linings of hydraulic brake system components.

1. Place a clean shop cloth beneath the brake master cylinder to prevent brake fluid spills.
2. With the ignition OFF and the brakes cool, apply the brakes 3-5 times, or until the brake pedal effort increases significantly, in order to deplete the brake booster power reserve.
3. If you have performed a brake master cylinder bench bleeding on this vehicle, or if you disconnected the brake pipes from the master cylinder, you must perform the following steps:
  - A. Ensure that the brake master cylinder reservoir is full to the maximum-fill level. If necessary add Delco Supreme 11®, GM P/N 12377967 (Canadian P/N 992667), or equivalent DOT-3 brake fluid from a clean, sealed brake fluid container.

If removal of the reservoir cap and diaphragm is necessary, clean the outside of the reservoir on and around the cap prior to removal.

- B. With the rear brake pipe installed securely to the master cylinder, loosen and separate the front brake pipe from the front port of the brake master cylinder.
    - C. Allow a small amount of brake fluid to gravity bleed from the open port of the master cylinder.
    - D. Reconnect the brake pipe to the master cylinder port and tighten securely.
    - E. Have an assistant slowly depress the brake pedal fully and maintain steady pressure on the pedal.
    - F. Loosen the same brake pipe to purge air from the open port of the master cylinder.
    - G. Tighten the brake pipe, then have the assistant slowly release the brake pedal.
    - H. Wait 15 seconds, then repeat steps 3.3-3.7 until all air is purged from the same port of the master cylinder.
    - I. With the front brake pipe installed securely to the master cylinder - after all air has been purged from the front port of the master cylinder - loosen and separate the rear brake pipe from the master cylinder, then repeat steps 3.3-3.8.
    - J. After completing the final master cylinder port bleeding procedure, ensure that both of the brake pipe-to-master cylinder fittings are properly tightened.
4. Fill the brake master cylinder reservoir to the maximum-fill level with Delco Supreme 11®, GM P/N 12377967 (Canadian P/N 992667), or equivalent DOT-3 brake fluid from a clean, sealed brake fluid container.

Clean the outside of the reservoir on and around the reservoir cap prior to removing the cap and diaphragm.

5. Install the **J 35589-A** to the brake master cylinder reservoir.
6. Check the brake fluid level in the **J 29532** , or equivalent. Add Delco Supreme 11®, GM P/N 12377967 (Canadian P/N 992667), or equivalent DOT-3 brake fluid from a clean, sealed brake fluid container as necessary to bring the level to approximately the half-full point.
7. Connect the **J 29532** , or equivalent, to the **J 35589-A** .
8. Charge the **J 29532** , or equivalent, air tank to 175-205 kPa (25-30 psi).
9. Open the **J 29532** , or equivalent, fluid tank valve to allow pressurized brake fluid to enter the brake system.
10. Wait approximately 30 seconds, then inspect the entire hydraulic brake system in order to ensure that there are no existing external brake fluid leaks.

Any brake fluid leaks identified require repair prior to completing this procedure.

11. Install a proper box-end wrench onto the RIGHT REAR wheel hydraulic circuit bleeder valve.
12. Install a transparent hose over the end of the bleeder valve.
13. Submerge the open end of the transparent hose into a transparent container partially filled with Delco Supreme 11®, GM P/N 12377967 (Canadian P/N 992667), or equivalent DOT-3 brake fluid from a clean, sealed brake fluid container.
14. Loosen the bleeder valve to purge air from the wheel hydraulic circuit. Allow fluid to flow until air bubbles stop flowing from the bleeder, then tighten the bleeder valve.
15. With the right rear wheel hydraulic circuit bleeder valve tightened securely - after all air has been purged from the right rear hydraulic circuit - install a proper box-end wrench onto the LEFT REAR wheel hydraulic circuit bleeder valve.
16. Install a transparent hose over the end of the bleeder valve, then repeat steps 13-14.
17. With the left rear wheel hydraulic circuit bleeder valve tightened securely - after all air has been purged from the left rear hydraulic circuit - install a proper box-end wrench onto the RIGHT FRONT wheel hydraulic circuit bleeder valve.
18. Install a transparent hose over the end of the bleeder valve, then repeat steps 13-14.
19. With the right front wheel hydraulic circuit bleeder valve tightened securely - after all air has been purged from the right front hydraulic circuit - install a proper box-end wrench onto the LEFT FRONT wheel hydraulic circuit bleeder valve.
20. Install a transparent hose over the end of the bleeder valve, then repeat steps 13-14.
21. After completing the final wheel hydraulic circuit bleeding procedure, ensure that each of the 4 wheel hydraulic circuit bleeder valves are properly tightened.
22. Close the **J 29532** , or equivalent, fluid tank valve, then disconnect the **J 29532** , or

equivalent, from the **J 35589-A**.

23. Remove the **J 35589-A** from the brake master cylinder reservoir.
24. Fill the brake master cylinder reservoir to the maximum-fill level with Delco Supreme 11®, GM P/N 12377967 (Canadian P/N 992667), or equivalent DOT-3 brake fluid from a clean, sealed brake fluid container.
25. Slowly depress and release the brake pedal. Observe the feel of the brake pedal.
26. If the brake pedal feels spongy perform the following steps:
  - A. Inspect the brake system for external leaks. Refer to **Brake System External Leak Inspection**.
  - B. Using a scan tool, perform the anti-lock brake system automated bleeding procedure to remove any air that may have been trapped in the BPMV. Refer to **ABS Automated Bleed Procedure** in Anti-lock Brake System.
27. Turn the ignition key ON, with the engine OFF. Check to see if the brake system warning lamp remains illuminated.

**IMPORTANT:** If the brake system warning lamp remains illuminated, **DO NOT** allow the vehicle to be driven until it is diagnosed and repaired.

28. If the brake system warning lamp remains illuminated, refer to **Symptoms - Hydraulic Brakes**.

#### HYDRAULIC BRAKE SYSTEM FLUSHING

**CAUTION:** Refer to **Brake Dust Caution** in Cautions and Notices.

**CAUTION:** Refer to **Brake Fluid Irritant Caution** in Cautions and Notices.

**NOTE:** Refer to **Brake Fluid Effects on Paint and Electrical Components Notice** in Cautions and Notices.

1. Inspect the brake fluid for the following conditions, indicating brake fluid contamination:
  - Fluid separation -- indicating two types of fluid are present; a substance other than the recommended brake fluid has been introduced into the brake hydraulic system
    - Swirled appearance - oil-based substance
    - Layered appearance - silicone-based substance
  - Fluid discoloration -- indicating the presence of moisture or particles that have been introduced into the brake hydraulic system

- Cloudy appearance - moisture
  - Dark appearance/ suspended particles in fluid - dirt, rust, corrosion, brake dust
2. Inspect the master cylinder reservoir cap diaphragm and the reservoir-to-master cylinder grommets for swelling, indicating brake fluid contamination.
  3. If the brake fluid WAS contaminated with an oil-based or a silicone-based substance - indicated by fluid separation and/or a swollen master cylinder reservoir cap diaphragm and/or swollen reservoir-to-master cylinder grommets, perform the following:
    - A. Remove ALL of the following components listed from the vehicle. Each component contains internal rubber seals/linings which have been contaminated by the contaminated brake fluid in the brake hydraulic system.

Refer to the procedures indicated.

- **Master Cylinder Replacement**
  - **Brake Hose Replacement - Front**
  - **Brake Hose Replacement - Rear**
  - **Brake Caliper Replacement - Front (Dual Piston)** in Disc Brakes
  - **Brake Caliper Replacement - Rear** , if equipped, in Disc Brakes
  - **Brake Pressure Modulator Valve (BPMV) Replacement** in Anti-lock Brake System
- B. Clean out all the hydraulic brake pipes using denatured alcohol, or equivalent.
  - C. Dry the brake pipes using non-lubricated, filtered air.
  - D. Repair or replace ALL of the following components listed and install them to the vehicle. Each component contains internal rubber seals/linings which have been contaminated by the contaminated brake fluid in the brake hydraulic system.

Refer to the procedures indicated.

- **Master Cylinder Overhaul** or **Master Cylinder Replacement**. Also perform the following:

Clean the brake master cylinder reservoir using denatured alcohol, or equivalent, then dry the reservoir using non-lubricated, filtered air. Inspect the reservoir for cracks and/or damage and replace if necessary. Refer to **Master Cylinder Reservoir Replacement**.

Replace the brake master cylinder reservoir cap diaphragm.

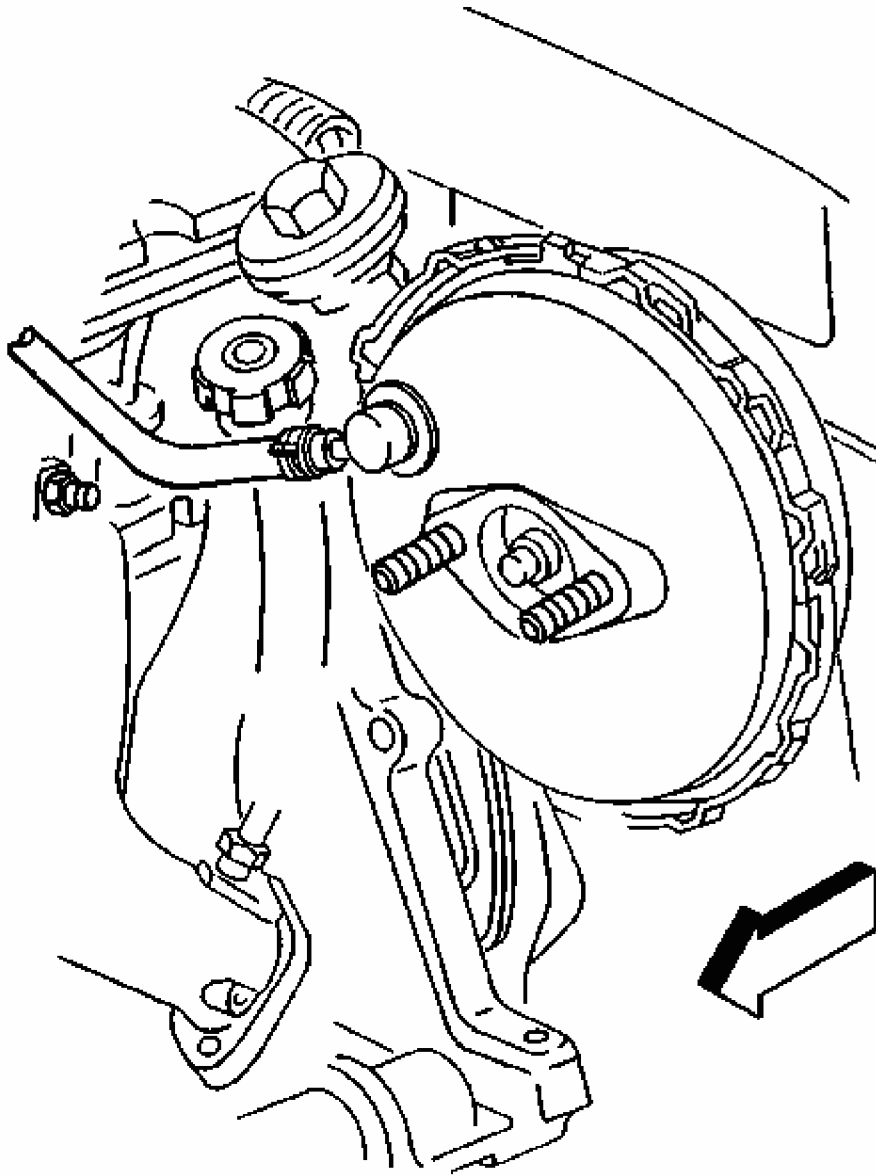
- **Brake Hose Replacement - Front**
- **Brake Hose Replacement - Rear**

- **Brake Caliper Overhaul - Front (Single Piston) Brake Caliper Overhaul - Front (Dual Piston) or Brake Caliper Replacement - Front (Dual Piston)** in Disc Brakes
  - **Brake Caliper Overhaul - Rear or Brake Caliper Replacement - Rear** , if equipped, in Disc Brakes
  - **Brake Pressure Modulator Valve (BPMV) Replacement** in Anti-lock Brake System
4. If the brake fluid was NOT contaminated with an oil-based or a silicone-based substance, but WAS contaminated with water or dirt, rust, corrosion, and/or brake dust, replace the brake master cylinder reservoir cap diaphragm which may have allowed the moisture or particles to enter the hydraulic system.
  5. Fill the brake master cylinder reservoir to the maximum-fill level with Delco Supreme 11® (GM P/N 12377967) or equivalent DOT-3 brake fluid from a clean, sealed brake fluid container.
  6. Pressure bleed the hydraulic brake system; begin the procedure with the pressure bleeder reservoir filled to the maximum-fill level with the correct brake fluid as indicated. Refer to **Hydraulic Brake System Bleeding (Manual)** or **Hydraulic Brake System Bleeding (Pressure)**.

## VACUUM BRAKE BOOSTER REPLACEMENT

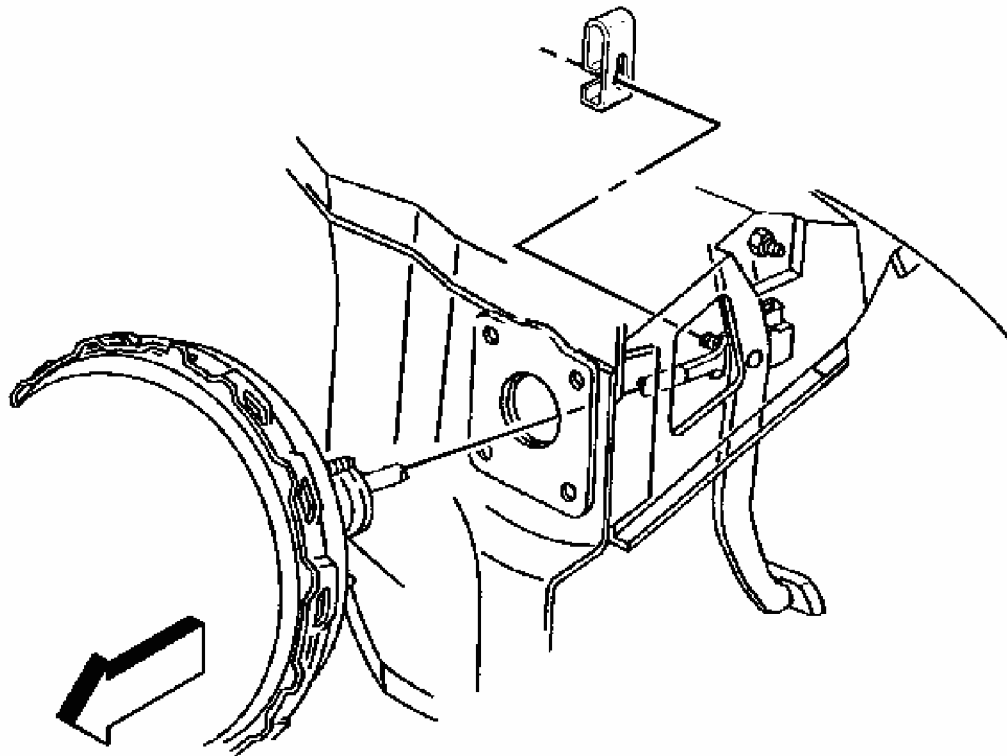
### Removal Procedure

1. Apply the parking brake.
2. Remove the master cylinder away from the vacuum booster. Refer to **Master Cylinder Replacement**.
3. Support the master cylinder.



**Fig. 51: View Of Vacuum Brake Booster Check Valve**  
**Courtesy of GENERAL MOTORS CORP.**

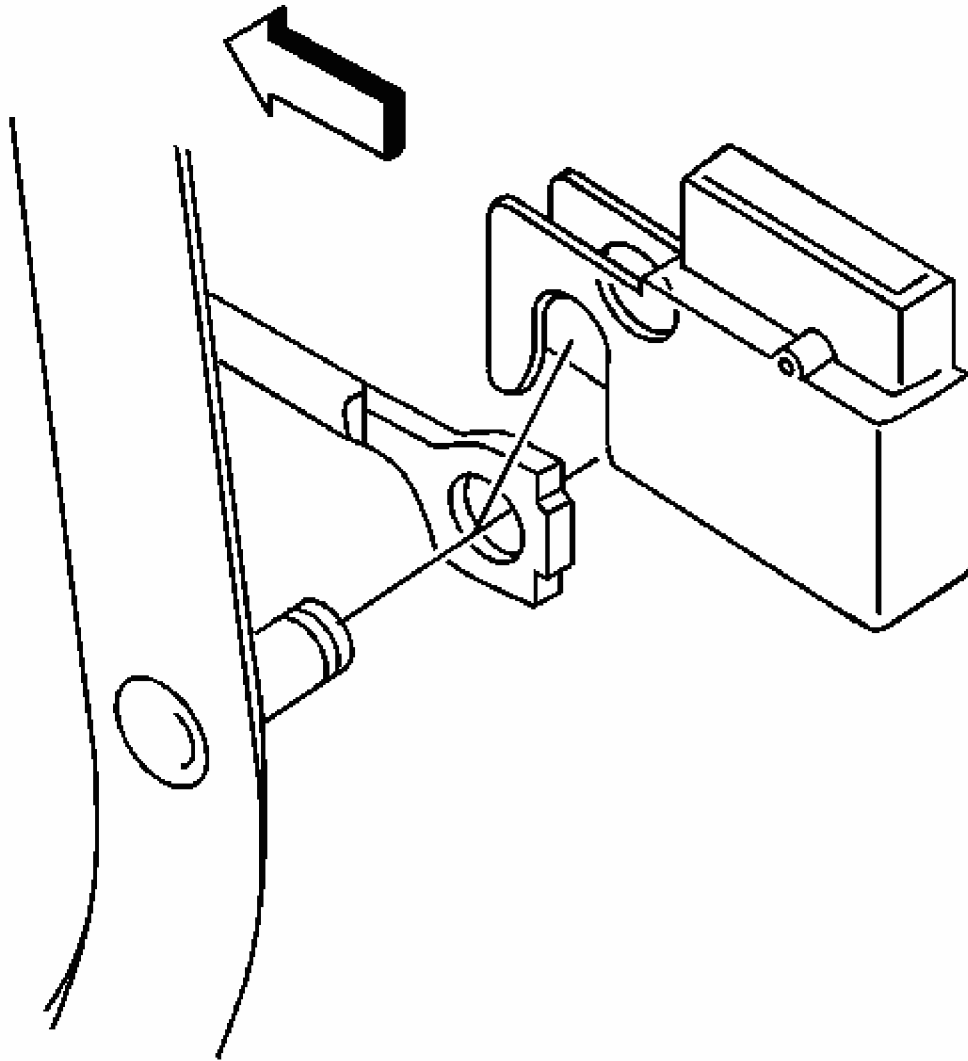
4. Disconnect the check valve from the vacuum booster.
5. Remove the left closeout/insulator panel. Refer to **Closeout/Insulator Panel Replacement - Left** in Instrument Panel, Gages and Console.



**Fig. 52: View Of Pushrod Retainer At Brake Pedal Pin**  
Courtesy of GENERAL MOTORS CORP.

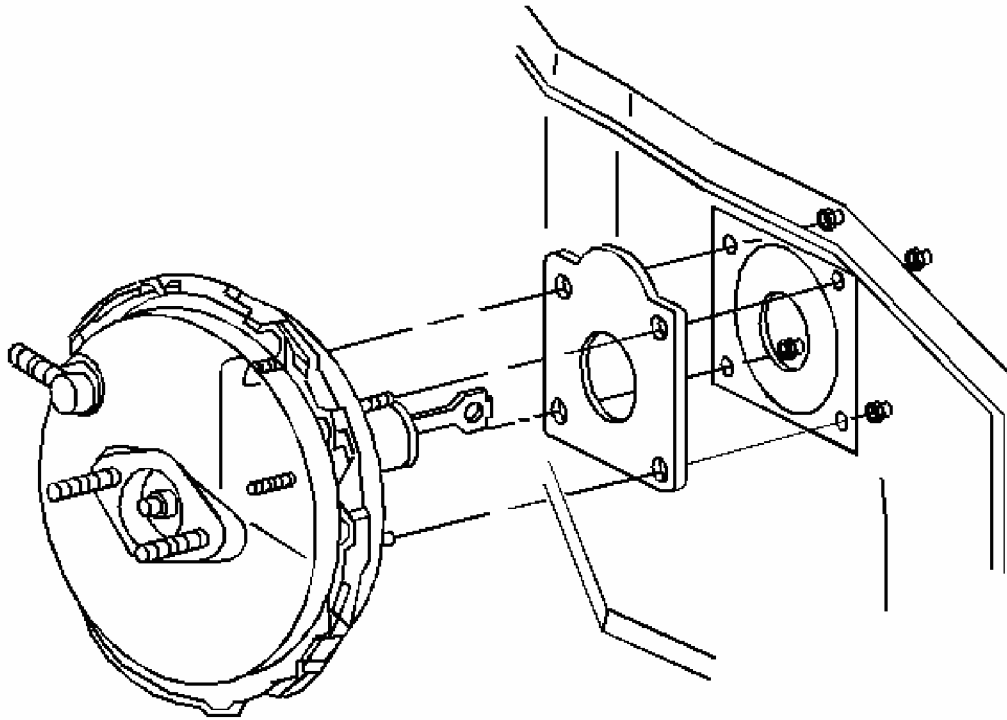
6. Remove the pushrod retainer from the brake pedal pin.





**Fig. 53: View Of Stoplamp Switch & Pushrod**  
Courtesy of GENERAL MOTORS CORP.

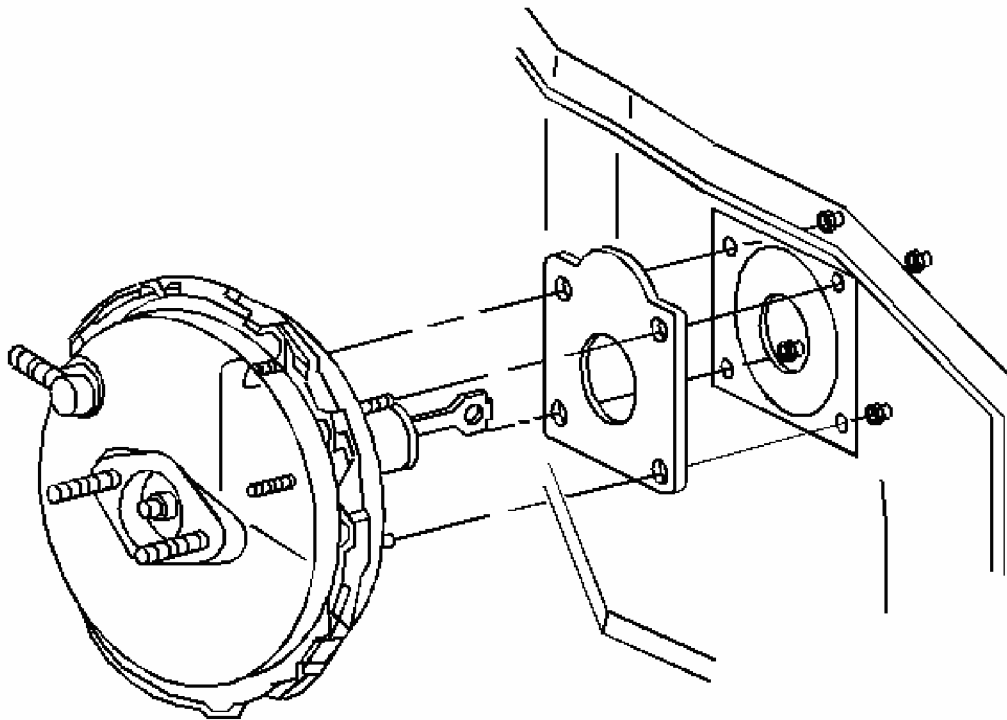
7. Remove the stoplamp switch and the pushrod from the brake pedal pin.
8. Remove the steering column support bracket. Refer to **Bracket Replacement - Steering Column** in Instrument Panel, Gages and Console.



**Fig. 54: View Of Vacuum Booster Assembly**  
**Courtesy of GENERAL MOTORS CORP.**

9. Remove the vacuum booster mounting nuts.
10. Remove the vacuum booster assembly.
11. Remove the gasket.

#### **Installation Procedure**



**Fig. 55: View Of Vacuum Booster Assembly**  
Courtesy of GENERAL MOTORS CORP.

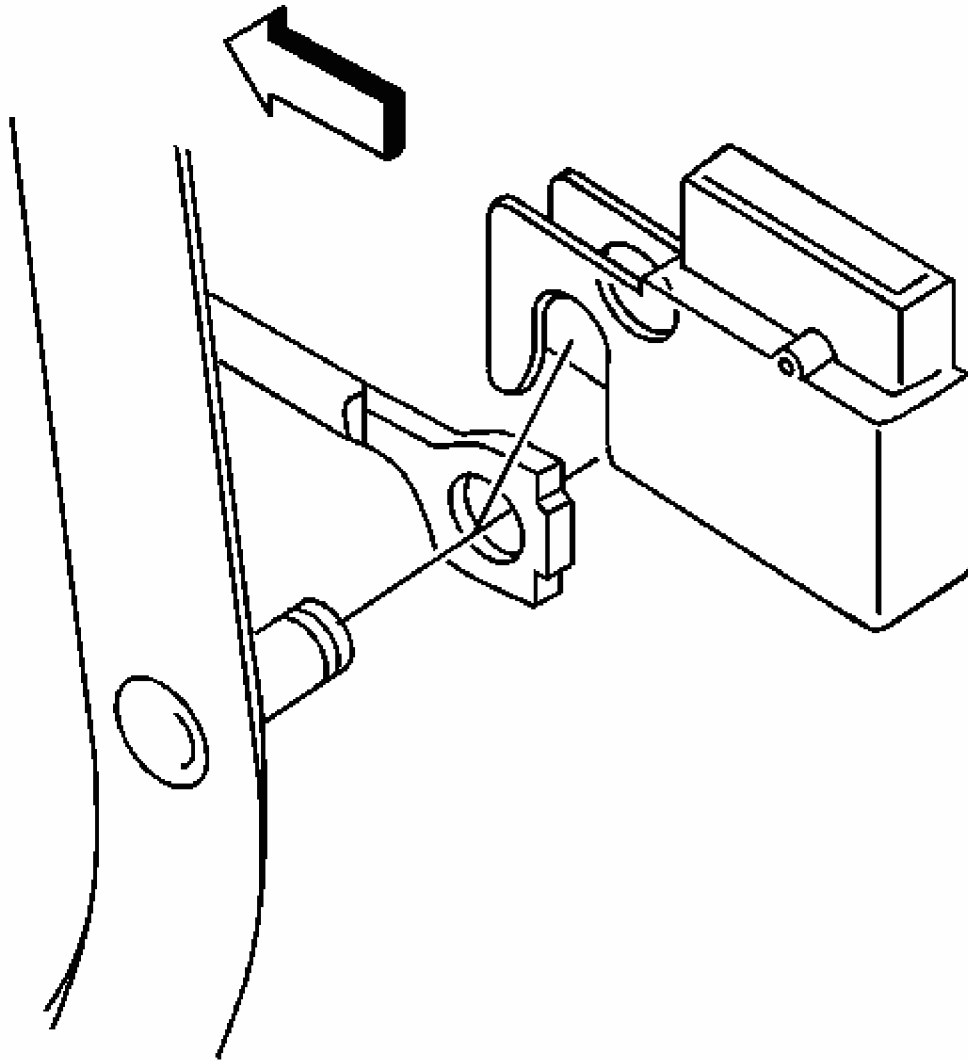
1. Install the vacuum booster assembly and the gasket.

**NOTE:** Refer to Fastener Notice in Cautions and Notices.

2. Install the vacuum booster mounting nuts on the vacuum booster.

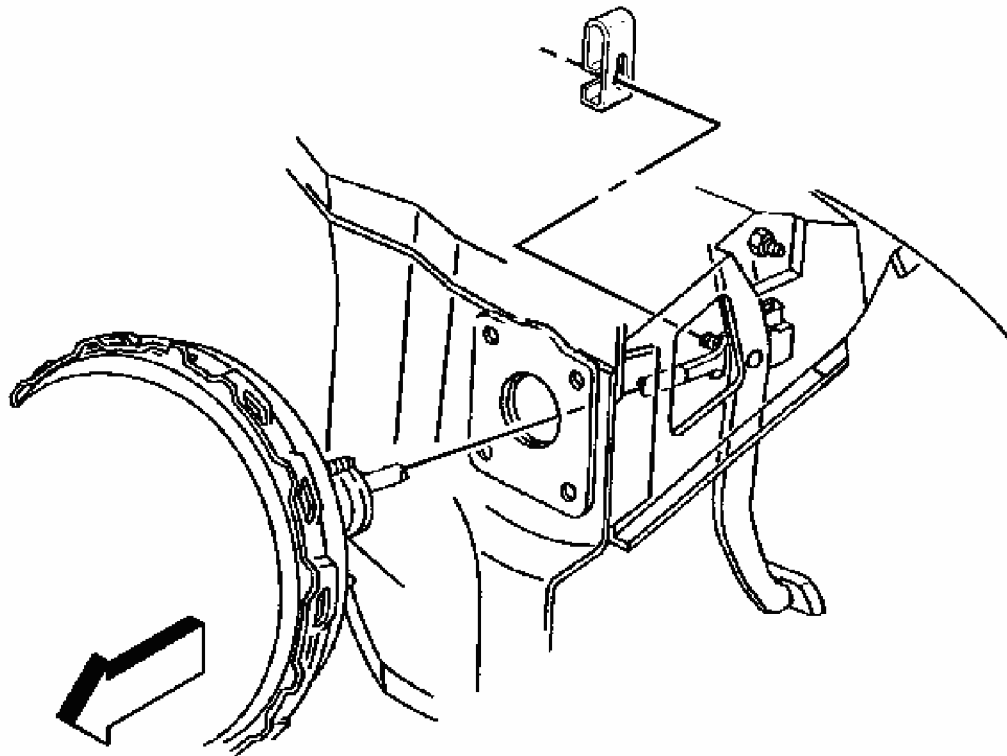
**Tighten:** Tighten the vacuum booster mounting nuts to 40 N.m (30 lb ft).

3. Install the steering column support bracket. Refer to **Bracket Replacement - Steering Column** in Instrument Panel, Gages and Console.



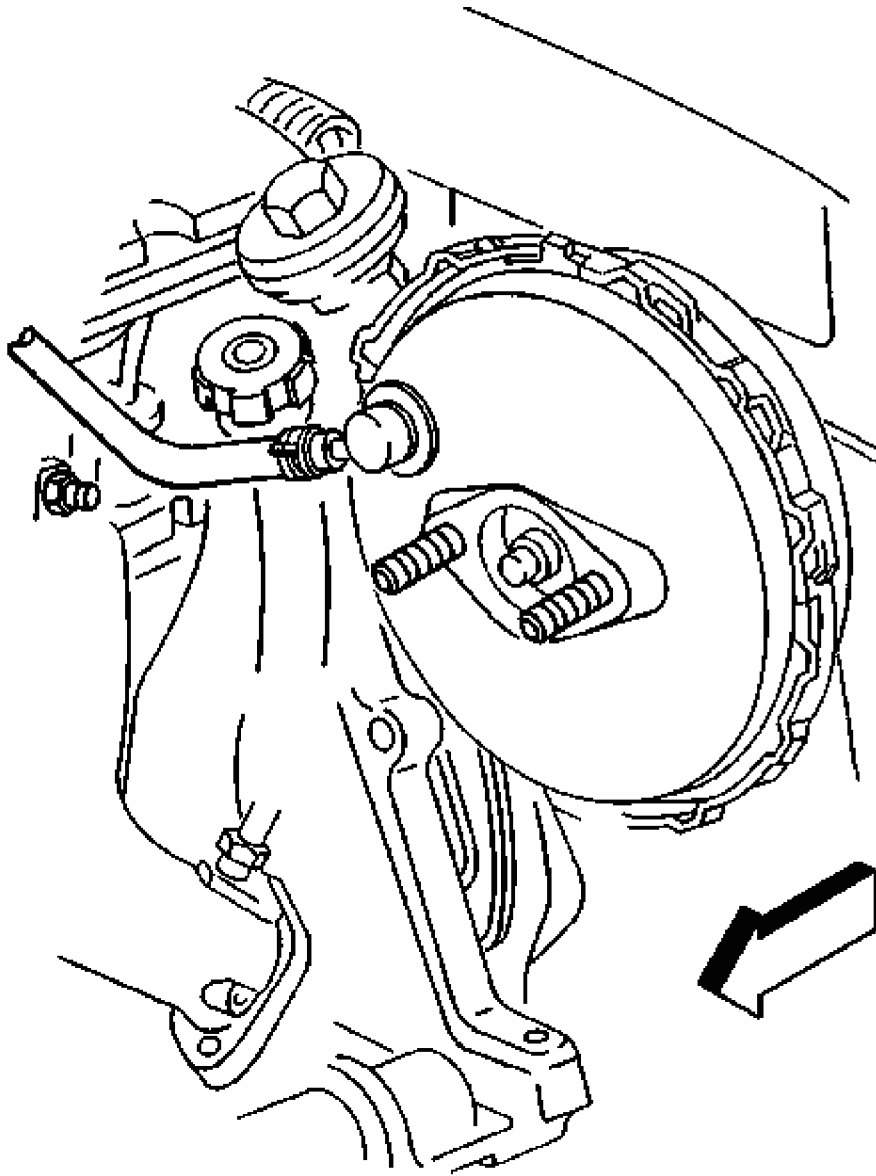
**Fig. 56: View Of Stoplamp Switch & Pushrod**  
Courtesy of GENERAL MOTORS CORP.

4. Install the stoplamp switch and the pushrod to the brake pedal pin.



**Fig. 57: View Of Pushrod Retainer At Brake Pedal Pin**  
Courtesy of GENERAL MOTORS CORP.

5. Install the pushrod retainer to the brake pedal pin. The retainer will snap into place.
6. Install the left closeout/insulator panel. Refer to **Closeout/Insulator Panel Replacement - Left** in Instrument Panel, Gages and Console.



**Fig. 58: View Of Vacuum Brake Booster Check Valve**  
**Courtesy of GENERAL MOTORS CORP.**

7. Install the check valve to the vacuum booster.
8. Install the master cylinder. Refer to Master Cylinder Replacement.

#### **VACUUM BRAKE BOOSTER CHECK VALVE AND/OR HOSE REPLACEMENT**

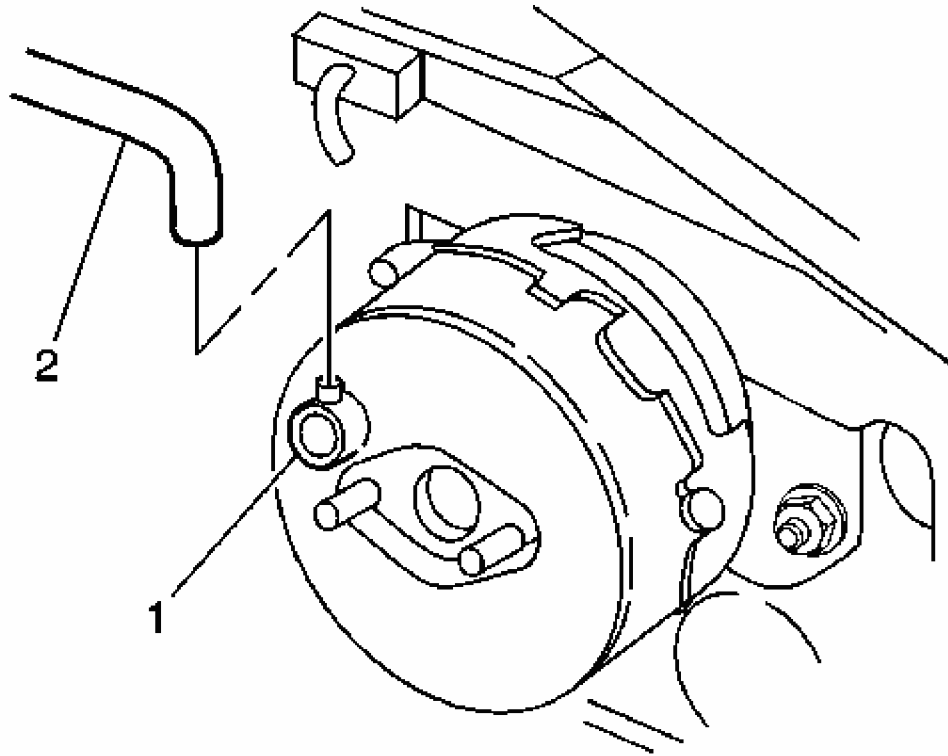
##### **Removal Procedure**

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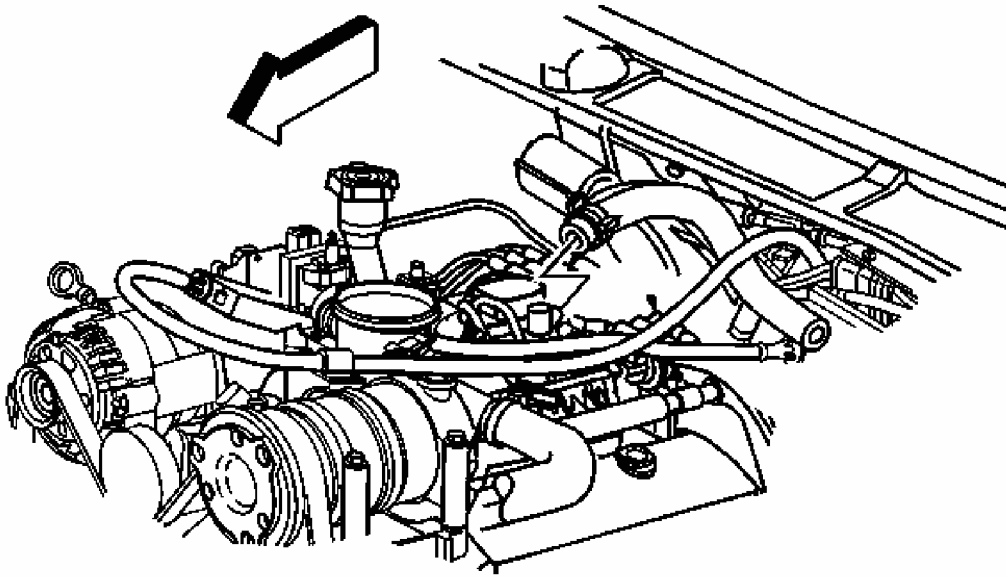
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**Fig. 59: Locating Vacuum Hose & Brake Booster Check Valve**  
**Courtesy of GENERAL MOTORS CORP.**

1. Remove the vacuum brake booster check valve (1) from the vacuum brake booster.
2. Remove the vacuum brake booster hose clamp at the check valve.
3. Remove the vacuum brake booster check valve from the hose (2).

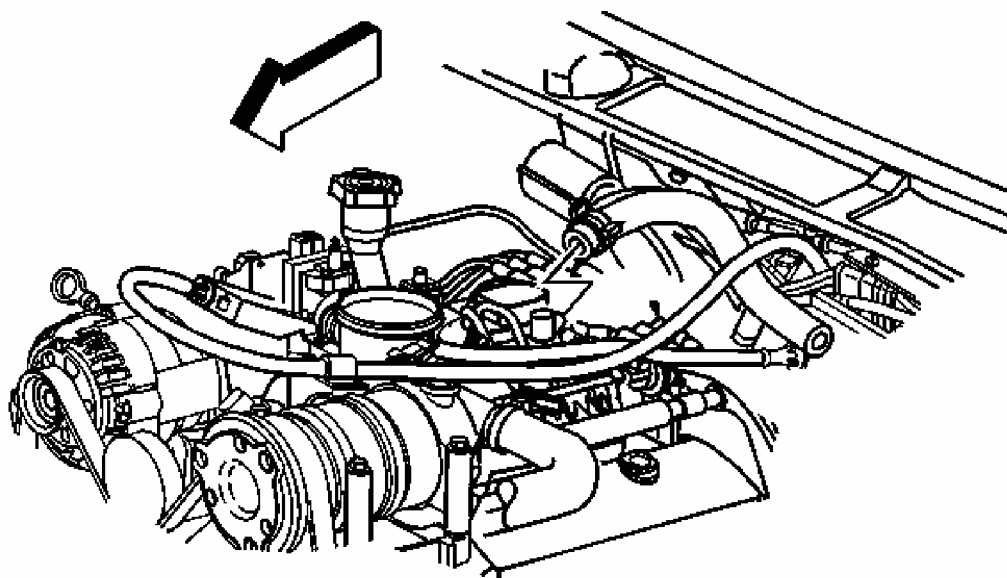


**Fig. 60: View Of Vacuum Brake Booster Hose**  
**Courtesy of GENERAL MOTORS CORP.**

4. Disconnect the vacuum brake booster hose at the engine.
5. Remove the vacuum brake booster hose from the vehicle.

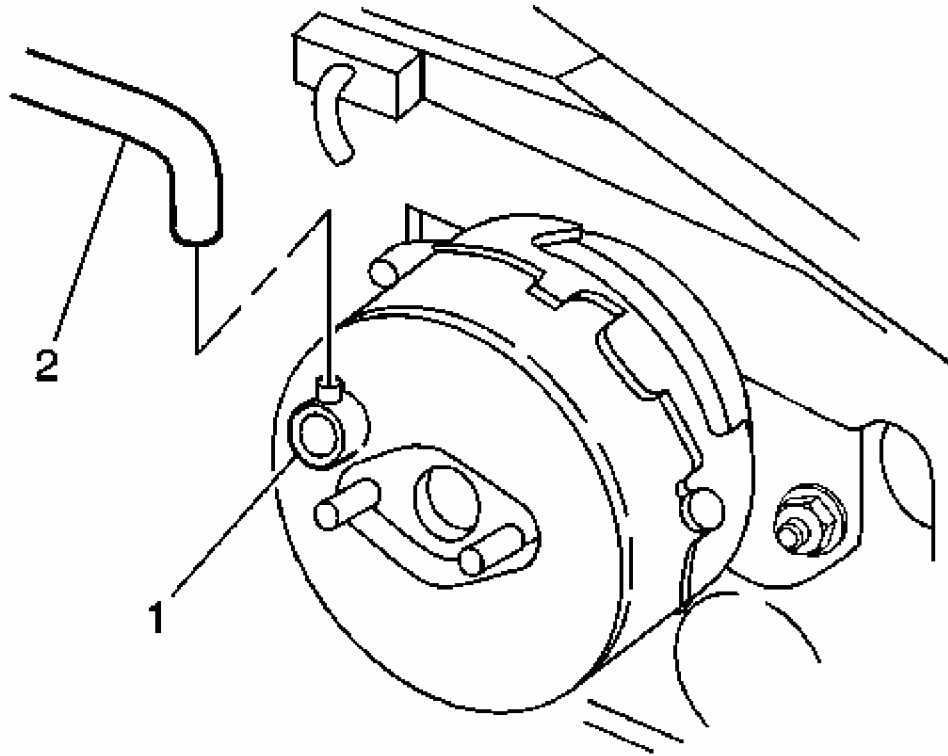
**Installation Procedure**





**Fig. 61: View Of Vacuum Brake Booster Hose**  
**Courtesy of GENERAL MOTORS CORP.**

1. Connect the vacuum brake booster hose at the engine.



**Fig. 62: Locating Vacuum Hose & Brake Booster Check Valve**  
Courtesy of GENERAL MOTORS CORP.

2. Install the vacuum brake booster check valve to the hose (2).
3. Install the vacuum brake booster hose clamp to the check valve.
4. Install the vacuum brake booster check valve (1) to the vacuum brake booster.

## DESCRIPTION AND OPERATION

### BRAKE FLUID AND BRAKE FLUID HANDLING

**CAUTION:** Refer to Brake Fluid Irritant Caution in Cautions and Notices.

**NOTE:** Refer to Brake Fluid Effects on Paint and Electrical Components Notice in Cautions and Notices.

Use extreme care when selecting brake system fluids or seal damage can result. Refer to

**Fluid and Lubricant Recommendations** in Maintenance and Lubrication to select the correct fluid.

Do not reuse brake system fluids. Do not mix power steering fluid with brake fluid. Fluid contamination may result in swelling and deterioration of rubber parts. This can lead to reduced brake performance and the eventual loss of braking capability.

Service booster components in a clean work area separate from the brake servicing area. Wash hands before changing work areas. Do not use the same containers for brake and power steering fluids.

**CAUTION: Brake fluid may be irritating to the skin or the eyes, or may cause nausea, vomiting, or diarrhea if swallowed. In case of contact or swallowing take the following actions:**

- **Eye contact - rinse thoroughly with water**
- **Skin contact - wash with soap and water**
- **If swallowed - Contact a physician immediately. Give two glasses of water and induce vomiting by sticking fingers down the throat.**

**NOTE: Brake fluid will damage electrical connections and painted surfaces. Use shop cloths, suitable containers, and fender covers to prevent brake fluid from contacting these areas. Always re-seal and wipe off brake fluid containers to prevent spills.**

Always store brake fluid in a closed, sealed container. Never use previously opened containers of stored brake fluid. Always use new brake fluid from a sealed container. Brake fluid left in open or improperly sealed containers will absorb moisture. Moisture can lower the brake fluid boiling point, causing the following problems:

- Brake system contamination
- Corrosion
- Deterioration of rubber components

#### **Substandard Or Contaminated Brake Fluid**

If the brake fluid contains improper fluid, water, or other contaminants, the brake fluid may boil or may deteriorate rubber components in the hydraulic brake system.

Evidence of rubber deterioration occurs in the following areas:

- Swollen master cylinder piston seals

- Swelling of the wheel cylinder boots
- Swelling of caliper boots
- Swelling of the master cylinder reservoir diaphragm

If rubber deterioration is found, replace all rubber parts, including the hoses, in the brake system. Inspect for brake fluid on the brake linings. Replace the brake linings that are contaminated with brake fluid.

If the brake fluid is contaminated and the master cylinder piston seals are good, check for leaks and excessive heat conditions. If no leaks or excessive heat conditions are found, flush the brake system.

#### **Flushing The Hydraulic Brake System**

In order to flush the brake hydraulic system, run new brake fluid through the brake system. Continue until the brake fluid at each bleeder valve comes out clear. Flushing is the only way to clean contaminated fluid out of the system. Flush the brake hydraulic system for the following reasons:

- New hydraulic brake parts are installed
- Contamination may be present
- You do not know the grade of brake fluid in the brake system
- Mineral oil is present in the brake fluid

### **BRAKE WARNING SYSTEM DESCRIPTION AND OPERATION**

#### **Brake Warning Indicator**

The instrument panel cluster (IPC) illuminates the brake warning indicator when one or more of the following occurs:

- The body control module (BCM) detects that the park brake is engaged. The IPC receives a class 2 message from the BCM requesting illumination.
- The electronic brake control module (EBCM) detects a low brake fluid condition. The IPC receives a class 2 message from the EBCM requesting illumination.
- The EBCM detects an ABS malfunction which disables dynamic rear proportioning (DRP). The IPC receives a class 2 message from the EBCM requesting illumination.
- The IPC performs the bulb check at the start of each ignition cycle. The brake warning indicator illuminates for approximately 3 seconds before turning OFF.
- The IPC detects a loss of class 2 communications with the BCM or with the EBCM.

### **HYDRAULIC BRAKE SYSTEM DESCRIPTION AND OPERATION**

#### **System Component Description**

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The hydraulic brake system consists of the following:

### **Hydraulic Brake Master Cylinder Fluid Reservoir**

Contains supply of brake fluid for the hydraulic brake system.

### **Hydraulic Brake Master Cylinder**

Converts mechanical input force into hydraulic output pressure.

Hydraulic output pressure is distributed from the master cylinder through two hydraulic circuits, supplying diagonally-opposed wheel apply circuits.

### **Hydraulic Brake Pressure Balance Control System**

Regulates brake fluid pressure delivered to hydraulic brake wheel circuits, in order to control the distribution of braking force.

Pressure balance control is achieved through dynamic rear proportioning (DRP), which is a function of the ABS modulator. Refer to **ABS Description and Operation** in Anti-lock Brake System for specific information on the operation of DRP.

### **Hydraulic Brake Pipes and Flexible Brake Hoses**

Carries brake fluid to and from hydraulic brake system components.

### **Hydraulic Brake Wheel Apply Components**

Converts hydraulic input pressure into mechanical output force.

#### **System Operation**

Mechanical force is converted into hydraulic pressure by the master cylinder, regulated to meet braking system demands by the pressure balance control system, and delivered to the hydraulic brake wheel circuits by the pipes and flexible hoses. The wheel apply components then convert the hydraulic pressure back into mechanical force which presses linings against rotating brake system components.

## **BRAKE ASSIST SYSTEM DESCRIPTION AND OPERATION**

#### **System Component Description**

The brake assist system consists of the following:

### **Brake Pedal**

Receives, multiplies and transfers brake system input force from driver.

**Brake Pedal Pushrod**

Transfers multiplied input force received from brake pedal to brake booster.

**Vacuum Brake Booster**

Uses source vacuum to decrease effort required by driver when applying brake system input force.

When brake system input force is applied, air at atmospheric pressure is admitted to the rear of both vacuum diaphragms, providing a decrease in brake pedal effort required.

When input force is removed, vacuum replaces atmospheric pressure within the booster.

**Vacuum Source**

Supplies force used by vacuum brake booster to decrease brake pedal effort.

**Vacuum Source Delivery System**

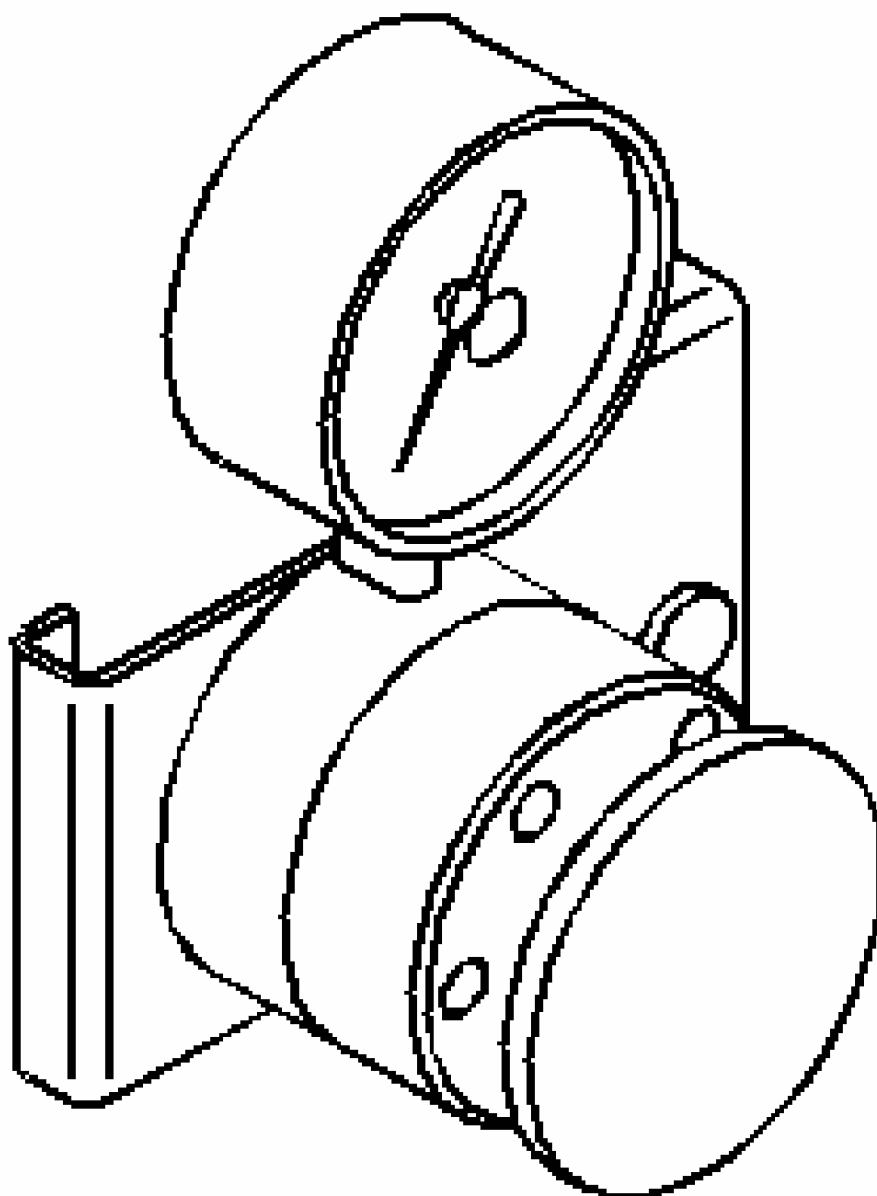
Enables delivery and retention of source vacuum for vacuum brake booster.

**System Operation**

Brake system input force is multiplied by the brake pedal and transferred by the pedal pushrod to the hydraulic brake master cylinder. Effort required to apply the brake system is reduced by the vacuum brake booster.

**SPECIAL TOOLS AND EQUIPMENT****SPECIAL TOOLS****Special Tools**

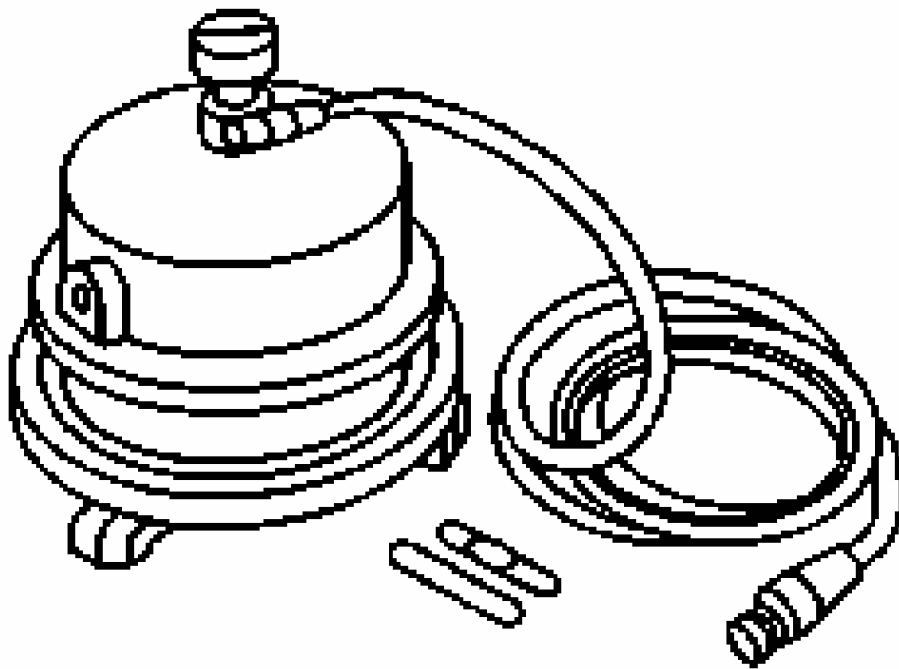
| Illustration | Tool Number / Description |
|--------------|---------------------------|
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J 28662  
Brake Pedal  
Effort Gage

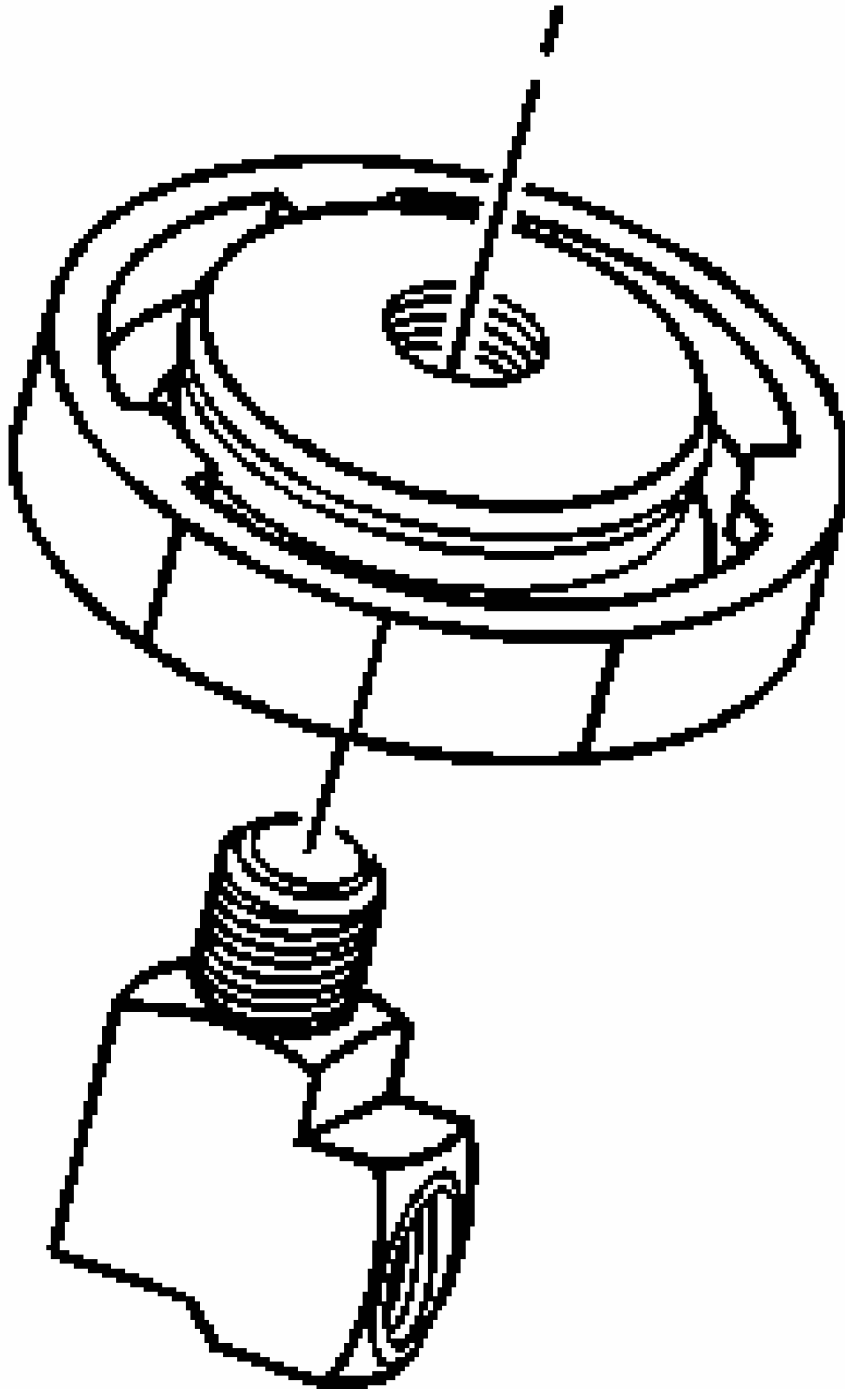
## 2004 Chevrolet Blazer

2004 BRAKES Hydraulic Brakes - Blazer/S10, Jimmy/Sonoma

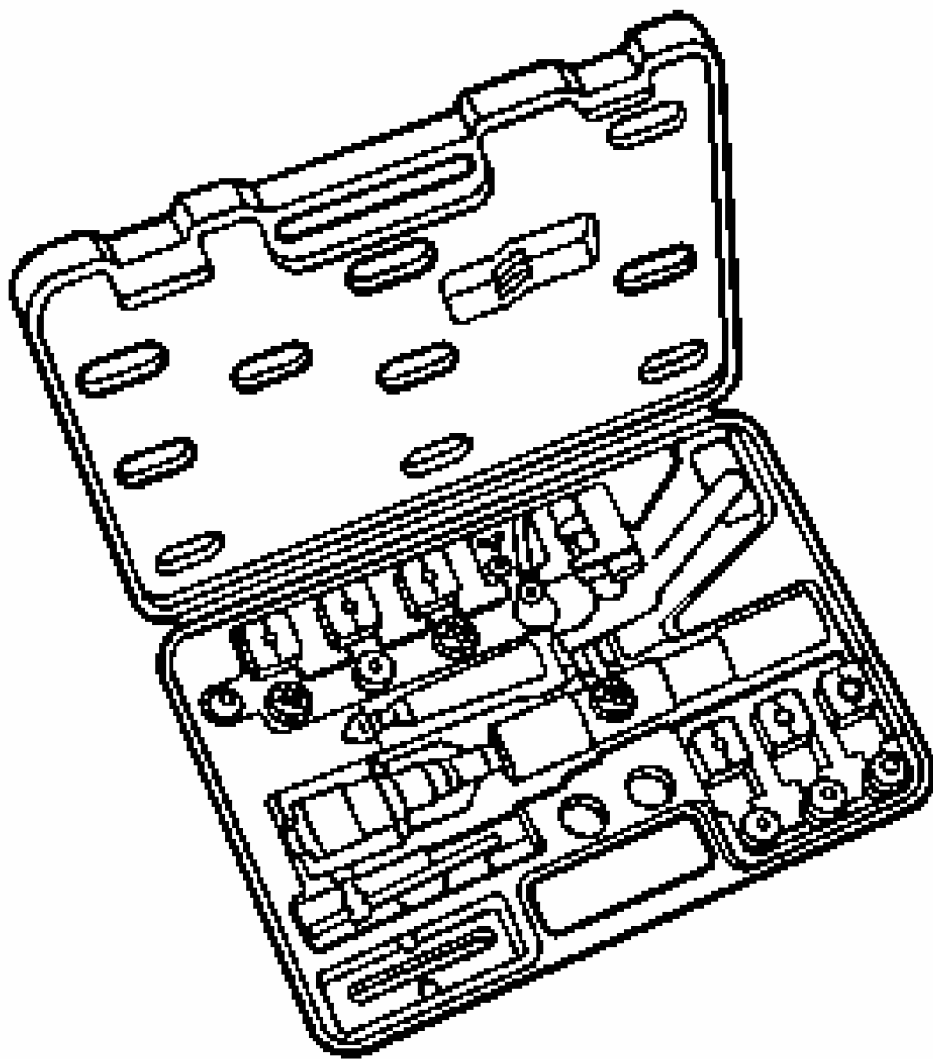


J 29532  
Diaphragm  
Pressure  
Bleeder





J 35589-A  
Master  
Cylinder  
Bleeder  
Adapter



J 45405  
Brake Pipe  
Flaring  
Tool Kit